

CWT Compact

INSTALLATION & MAINTENANCE

MANUAL



Issue 1, 2011-10-14
Ordering No. 0400-T0230



CALE

APPROVALS

- **PCI Data Security Standard (PCI DSS), Level 1.**

A set of comprehensive requirements for enhancing payment account data security. Developed by the founding payment brands of the PCI Security Standards Council, including American Express, Discover Financial Services, JCB International, MasterCard Worldwide and Visa Inc. Inc. International, to help facilitate the broad adoption of consistent data security measures on a global basis. This is a multifaceted security standard that includes requirements for security management, policies, procedures, network architecture, software design and other critical protective measures. This comprehensive standard is intended to help organizations proactively protect customer account data.

- **EN 12414 - Vehicle parking control equipment – Pay and display ticket machines – Technical and functional requirements.**

This European standard incorporates provisions from numerous other EN and IEC publications. Due to essential openings in a pay and display terminal, it is not possible to achieve an IP33 certification. The presence of a coin inlet, a card inlet, and a coin return cup will allow a maximum rating of IP 1X. If the IP rating is followed by an additional letter, it specifies that protection against hazardous parts is in fact higher than the first digit of the rating implies. For example, IP 13D indicates that the protection against hazardous parts is higher than an IP 43 rating. Consequently, Cale claims that the IP 33 required according to SS-EN 12414 (Vehicle parking control equipment - Pay and display ticket machines - Technical and functional requirements) is irrelevant and should be replaced by an IP 13D rating.

- **EN 14450 - Secure storage units. Requirements, classification and methods of test for resistance to burglary.**

Secure safe cabinets. The CWT Compact is tested according to this standard with very good result but a pay and display terminal cannot be certified to this standard due to the requirements of the standard. Test documentation is available from Cale Access.

- **FCC part 15 (2006) Subpart B, class B**
- **ADA, DDA and Article 11**
- **CE**

Cale Access AB
Box 1031, SE-164 21 KISTA

E-mail: sales@cale.se
support@cale.se

Website: www.calegroup.se

Acrobat and Adobe Acrobat are trademarks or registered trademarks belonging to Adobe Systems Inc
CALE is a registered trademark of Cale Access AB

© Cale Access AB 2011

All rights reserved. This information may not be passed on to any third party, duplicated, or saved on another medium without the express written permission of Cale Access AB.

To the extent practically possible, we have verified that the material in this manual is correct at the time of publication. Cale Access AB assumes no liability for damages caused either directly or indirectly by errors in or shortcomings of this manual.

Contents

APPROVALS.....	2
1 ABOUT THE MANUAL	8
1.1 Target audience.....	8
1.2 Other product related documents	8
1.3 Terminology	8
1.4 Changes in this issue	10
2 SAFETY.....	11
2.1 Introduction	11
2.1.1 High voltage	11
2.2 Batteries.....	11
2.2.1 Disposal.....	11
2.2.2 Back-Up battery holder on CPU board	11
2.2.3 Short-circuit risk	12
2.2.4 Caustic acid.....	12
2.2.5 Risk of explosion	13
2.3 LCD display	13
2.4 Heavy lifting	13
2.5 Risk of tipping	13
2.6 ESD protection.....	13
2.6.1 What is ESD?	13
2.6.2 Avoiding ESD damage	14
3 PRODUCT PRESENTATION.....	15
3.1 The CWT Compact System.....	15
3.2 Data communication	16
3.2.1 Cale WebOffice 2 (CWO 2).....	16
3.3 Payment.....	16
3.3.1 Means of payment.....	16
3.3.2 Payment applications	16
3.4 Transaction processing	17
3.5 The service menu	17
3.6 Mechanical design	17
3.6.1 General.....	17
3.6.2 Door locks	18
3.6.3 Door-open sensors.....	20
3.6.4 Inside the cabinet	21
3.6.5 Inside the base	23
3.7 Power supply alternatives.....	25
3.8 Administrative tools	25

3.9	Cash collection system	25
4	FUNCTIONAL DESCRIPTION.....	26
4.1	Operator controls	26
4.1.1	CWT Compact without keyboard	26
4.1.2	CWT Compact with keyboard	26
4.2	Coin system	26
4.2.1	Antipin module	27
4.2.2	Coin verifier	31
4.2.3	Escrow.....	33
4.2.4	Coin handling board	35
4.2.5	Coin box	35
4.3	Card payment system.....	35
4.3.1	Card readers	35
4.3.2	Credit/debit card verification.....	36
4.4	Print system	36
4.4.1	Thermal printer	37
4.4.2	Paper supply	42
4.5	Mechanical locks	42
4.6	Electronic locks.....	42
4.7	Door sensors	43
4.8	CWT Compact control system.....	43
4.8.1	CPU board.....	43
4.9	The CWT Compact display PCB assembly	45
4.9.1	Display component.....	45
4.9.2	Warning/error indicator.....	45
4.10	Heating system	46
4.11	Power supply	46
4.11.1	Power control	46
4.11.2	Battery charging by mains power.....	47
4.11.3	Battery charging by solar power.....	47
4.12	CWT Compact interconnections.....	49
5	INSTALLATION	51
5.1	Site preparations	51
5.1.1	Space requirements	51
5.1.2	Power supply.....	51
5.1.3	Placing the terminal on an existing concrete foundation	52
5.1.4	Pouring a new concrete foundation	53
5.2	Installing the terminal.....	54
5.2.1	Putting the base or complete terminal in place	55
5.2.2	Mounting the cabinet on top of the base	55
5.2.3	Installing the battery in a mains powered terminal.....	55
5.2.4	Installing the battery in a solar or battery-only powered terminal	56

5.2.5	Connecting to the mains power grid	56
5.2.6	Installing a modem	56
5.2.7	Loading paper	58
5.2.8	Installing the coin box.....	59
5.3	Program loading	59
5.4	Changing the terminal's settings	59
6	OPERATION	60
6.1	Changing and emptying the coin box	60
6.1.1	Removing the coin box.....	60
6.1.2	Emptying the coin box.....	60
6.1.3	Inserting the coin box	60
6.2	Paper refill.....	61
7	PREVENTIVE MAINTENANCE	62
7.1	Batteries.....	62
7.1.1	Lead accumulators.....	62
7.1.2	Battery on CPU board	62
7.2	Printer	62
7.2.1	Cleaning	62
7.2.2	Testing.....	63
7.3	Coin handling unit.....	64
7.3.1	Cleaning	64
7.3.2	Testing.....	64
7.4	Chip-card reader.....	64
7.4.1	Cleaning	64
7.4.2	Testing.....	64
7.5	Hybrid card reader.....	64
7.5.1	Cleaning	64
7.5.2	Testing.....	64
7.6	Display module, cleaning.....	64
7.7	Cabinet	65
7.7.1	Cleaning	65
7.7.2	Lubrication.....	65
7.8	Cabinet door display window, cleaning	65
7.9	Solar panel, cleaning	66
8	CORRECTIVE MAINTENANCE	67
8.1	Cabinet and base lacquer, touching up.....	67
8.2	Printer	67
8.2.1	Print head, cleaning	67
8.2.2	Printer platen and feed rollers, cleaning	67
8.2.3	Paper jam clearing	67
8.2.4	Front pressure rollers replacement.....	68

8.2.5	Rear pressure rollers replacement.....	69
8.2.6	Presenter table replacement.....	70
8.2.7	Cutting blade replacement.....	71
8.2.8	Print head replacement.....	72
8.2.9	Platen replacement.....	73
8.2.10	Front and rear feed rollers replacement.....	74
8.3	Cabinet door replacement.....	74
8.4	Base door replacement.....	75
8.5	Display window replacement in CWT Compact.....	76
8.6	Coin unit replacement.....	76
8.7	Coin verifier replacement.....	77
8.8	CPU board lithium cell replacement.....	78
8.9	CPU core module replacement.....	78
8.10	E-lock replacement.....	79
9	CHANGING THE CWT COMPACT SOFTWARE AND FIRMWARE.....	81
9.1	Changing the CWT application program.....	81
9.1.1	Changing via Cale WebOffice.....	81
9.1.2	Changing specific settings via the service menu.....	81
9.1.3	Updating the whole application via the service menu.....	81
9.2	Updating the AVR firmwares.....	81
9.2.1	Updating the AVR firmwares through a USB memory device.....	82
9.2.2	Updating the AVR firmwares from a PC.....	83
9.3	Updating the printer firmware.....	86
9.4	Updating the card reader firmware.....	86
9.5	Updating the Windows CE operating system from a PC.....	86
9.5.1	Prepare the PC.....	86
9.5.2	Install the JLinkARM PC program.....	86
9.5.3	Updating procedure.....	89
9.6	Updating the Windows CE operating system from a USB memory device.....	91
9.6.1	Updating the OS in CWT Compact.....	91

1 ABOUT THE MANUAL

The manual is available either as a bound printed volume, or as an Acrobat (.pdf) file that Cale distributors can download from the *Partner Area* of our website (<http://www.calegroup.se>). We recommend you to visit the web site regularly to ensure that you have the latest version of the manual.

Keep previous issues of the manual because Cale Access cannot guarantee that new issues will include information on older versions of the CWT Compact products.

All available functions are described in the manual without specifically mentioning which functions are implemented as standard and which of them that is optional.

1.1 Target audience

This manual is intended primarily for personnel who plan and carry out the installation and maintenance of the CWT Compact terminals in the field.

1.2 Other product related documents

- **CWT Software Configuration Handbook** (0400-T0232). This document also describes the service menu AVR and program updating procedures, information that may be required during installation and maintenance.
- **CWT User Interface Design Handbook**
- **CWT 104 & Compact Installation & Maintenance**
- **TTP 2000 Kiosk Printer – Service Manual**. Download from www.zebra.com.

1.3 Terminology

Term	Meaning
APN	An Access Point Name (APN) identifies an external network that is accessible from a terminal. An APN has several attributes associated with it that define how you can access the external network at that point. By default, the SIM card in your terminal is configured with the APN of your service provider. You may want to configure further APNs if you have arranged with your service provider to use more than one SIM Card, or to grant your SIM Card on several APN. In most cellular networks there are two types of APNs: the usual WAP APN, enabling access to the default WAP content (or the operator's walled garden) and a second type, known as Internet or WEB APN, which enables access to all content. The WAP APN normally filters non-WAP content by traffic, ports or volume. The Internet/Web APN is normally unfiltered and often the operator will charge a higher tariff for it. Handhelds, laptops and smart phones normally need to use the Internet/Web APN when using applications or an HTML browser
ASP	Application Service Provider

Term	Meaning
AVR	The AVR is an 8-bit RISC single chip microcontroller. The AVR uses on-chip flash memory for program storage. See more about AVR updates in the <i>CWT Software Configuration Handbook</i> .
CWO 2/ CWO	Cale WebOffice 2, an internet based back office system from Cale Access
CWT	Common term for all Cale WebTerminal models (CWT 2110, CWT 2115, CWT 2120, CWT Compact Classic, CWT 104 and CWT Compact).
CWT Compact	Common term for the CWT Compact with or without keyboard.
ESD	Electro Static Discharge
Firmware	Firmware is a computer program that is embedded in a hardware device, for example a microcontroller. Firmware is somewhere between hardware and software. Like software, it is a computer program which is executed by a computer. But it is also an intimate and vital part of a piece of hardware, and has little meaning outside of that particular hardware.
GPRS	General Packet Radio Service is a mobile data service available to users of GSM (see below) mobile phones and modems. GPRS is packet-switched meaning that multiple users share the same transmission channel, only transmitting when they have data to send. Thus the total available bandwidth can be immediately dedicated to users who are actually sending at any given moment, providing higher utilization where users only send or receive data intermittently. Usually, GPRS data are billed per kilobytes of information transferred.
GSM	The Global System for Mobile communications is the most popular standard for mobile phones in the world. It includes packet data capabilities by means of GPRS (see above).
LAN	Local Area Network
Magstripe	Short for <i>Magnetic stripe</i>
PCB	Printed Circuit Board – A thin board with electrical wires "printed" onto the board, connecting the central processor to other components on the board. Some examples of PCBs include motherboards, RAM chips, and network interface cards.
RFID	Radio Frequency Identification – An automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of identification using radio waves. Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating an RF signal. The second is an antenna for receiving and transmitting the signal.

Term	Meaning
Residual-current device (RCD)	Also known as a <i>ground fault circuit interrupter (GFCI)</i> , <i>ground fault interrupter (GFI)</i> or an <i>appliance leakage current interrupter (ALCI)</i> . In Australia they are sometimes known as "safety switches". The device disconnects a circuit whenever it detects that the electric current is not balanced between the live and the neutral conductors. Such an imbalance is sometimes caused by current leakage through the body of a person who is grounded and accidentally touching the energized part of the circuit.
TFT	TFT-LCD (Thin Film Transistor-Liquid Crystal Display) is a variant of Liquid Crystal Display (LCD) which uses Thin-Film Transistor (TFT) technology to improve image quality. TFT LCD is one type of active matrix LCD, though it is usually synonymous with LCD.
Wi-Fi	Short for <i>Wireless Fidelity</i> , a wireless technology brand owned by the Wi-Fi Alliance intended to improve the interoperability of wireless local area network products based on the IEEE 802.11 standards.

1.4 Changes in this issue

Edition	Changes
1	No changes listed because this is the first issue published.

2

SAFETY

2.1 Introduction

This manual uses the labels listed below to indicate specific type of risks that you will encounter during certain procedures:

 **DANGER!** — Danger means that an accident may occur if the safety precautions are not followed. This type of accident is likely to be fatal to human beings.

 **WARNING!** — Warning means that an accident may occur if the safety precautions are not followed. This type of accident may be fatal or cause severe injuries to human beings or may create essential damage to the product.

 **CAUTION!** — An accident could occur if safety instructions are not followed. This type of accident may cause injury to people or may create damage to the product.

 **CAUTION!** — ESD-sensitive component. Follow procedures for ESD protection. See Section *ESD protection*.

2.1.1 High voltage

 **DANGER!** — Contact with live components of equipment powered by high-voltage current can be life-threatening. Also bear in mind that moist components may conduct electricity although they possess insulating properties when dry.

Some parts inside the terminal's base and in the heating system inside the cabinet are live with hazardous voltage even when the terminal is switched OFF.

Before working on components that conduct high-voltage electricity:

- Turn OFF the power supply. Unscrew or switch OFF the fuse if there is one.
- Make sure that the equipment is not exposed to moisture while you are working.
- Follow all applicable local worker safety regulations.

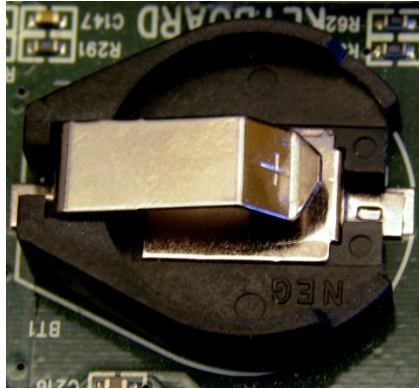
2.2 Batteries

2.2.1 Disposal

Lead acid batteries should be disposed of according to the manufacturer's instructions.

2.2.2 Back-Up battery holder on CPU board

 **CAUTION** — It is very important that the battery is of an approved brand (Duracell, Eveready, Panasonic, Ray-O-Vac, Sanyo, Varta, Toshiba, Seiko or another major battery manufacturer) and that it is kept clean. Oils from fingers (i.e. fingerprints) may together with humidity and time cause problems. Such dirt may just as well be deposited on the underside of the positive contact spring, if a dirty battery has been mounted in the holder. In some cases the back-up batteries on the CPU boards are causing malfunctions (real-time clock instability, memory loss). This is caused by bad contact between the contact springs of the battery holder and the coin cell battery.



As the holder is made out of a material impervious to most industrial solvents, you may use most any cleaning solvent at hand (isopropyl alcohol is recommended). Cale recommend you to wear cotton or latex gloves when replacing batteries in order to prevent fingerprints on the battery surfaces. It is also recommended to inspect the positive spring contact in order to establish that it has not been bent upwards to such an extent that the pushing force has been affected, even as it is made out of spring steel.

In order to prevent excessive bending of the positive contact spring, Cale recommend the use of a pair of plastic (or otherwise insulated) pliers when mounting new batteries. The coin cell should be pushed in such that the cell is in contact with the plastic housing of the battery holder, not bending the positive contact spring upwards more than absolutely necessary.

2.2.3 Short-circuit risk

⚠ WARNING! — Although the battery voltage is relatively low, there is a risk of personal injury (such as burns) if the battery poles are short-circuited. Make sure you do not short-circuit the battery when using tools and other metal objects.

When working with equipment connected to the power supply:

- Remove rings, necklaces, watches, key rings with chains, etc.
- Always use insulated tools.
- Follow all applicable local worker safety regulations.

2.2.4 Caustic acid

Only batteries that are not maintenance-free need to be checked regularly.

⚠ WARNING! — The sulphuric acid used in lead batteries is caustic. Always wear eye protection when checking the battery acid level and refilling with water. If you get acid in your eyes, flush them immediately with water. There should be facilities for flushing eyes where the battery is charged. If you get acid on your skin, wash immediately with soap and water.

Handle the battery with care during transportation and installation.

Follow all applicable local worker safety regulations.

2.2.5

Risk of explosion

 **WARNING!** — Battery charging develops hydrogen gas that is highly explosive and inflammable. The charging area must therefore be well ventilated. Besides hydrogen gas, an acid fog is also developed.

An explosion may also occur within a few seconds if the battery poles are short circuited by a metal object such as a wrench and sulphuric acid will then be spread around.

Fire extinguishers must be accessible and clearly marked. You must not smoke, weld, cut, or use an open flame in the charging area. The charger must be OFF both when you connect and when you disconnect the battery.

Follow all applicable local worker safety regulations.

2.3

LCD display

 **WARNING!** — The liquid inside the CWT Compact LCD display is a hazardous substance. If the display panel is damaged and the liquid crystal substance leaks out, **be sure not to get any in your mouth**. If the substance comes into contact with your skin or clothes thoroughly and promptly wash it off using soap and water.

2.4

Heavy lifting

 **WARNING!** — When lifting equipment that weighs more than 20 kg, always use a hoist, or let two or more people lift it. There is a major risk of back injury or sprain.

The weight of the terminal depends on the configuration.

Follow all applicable local worker safety regulations.

2.5

Risk of tipping

 **WARNING!** — Before the terminal is fixed with screws to the floor or ground, there is a risk that it may tip, especially if you open the doors.

The top cabinet can tip forward if it is not fixed to the base.

2.6

ESD protection

2.6.1

What is ESD?

ESD is an abbreviation for Electro Static Discharge.

Electrical charges build up when materials are rubbed or separated – when you walk across a carpet, for example, or get out of your car. The charge, which may be several thousand volts, can then be transferred to other objects if they get close enough.

Handling ordinary plastic causes a charge to build up.

Most modern integrated circuits are extremely sensitive to ESD. The component either ceases functioning altogether, causing the equipment to stop working, or suffers damage

that makes it extremely susceptible to further injury. This can eventually result in intermittent faults that are extremely difficult to locate.



CAUTION ! — Never expose ESD-sensitive components to shocks of static electricity.

2.6.2

Avoiding ESD damage

Rule number 1: **Prevent charge build-up!**

Plastic packaging and other large plastic objects can transfer charges to conductive objects, which can then damage components. Except for special anti-static plastic, all plastic must be kept away from unconnected printed circuit board assemblies.

If you need to work with electronic components or modules, connect yourself through a wristband to a grounded part inside the terminal.

Avoid touching connector pins/poles and components on printed circuit board assemblies.

Ensure that all components containing electronic parts are always stored in an ESD protection bag when handled outside the terminal.

Remember that the bags' insulating properties gradually wear out, and a **new bag must always be used**.

The following ESD protection accessories can be ordered from Cale Access AB.

0401-E0360	Wristband (for connection to the ticket terminal cabinet)
0040-07012	ESD bag, small (fits print head and coin verifier, etc.)
0040-07013	ESD bag, large (fits CPU board etc.)

3.1 The CWT Compact System

The Cale Web Terminal Compact system includes the two models CWT Compact (with keyboard and without keyboard). The main difference between them is the input devices which will be described in this chapter. Other modules and functions of the terminals are described later in this manual.

The CWT Compact System has a monochrome graphical 148×73 mm active area display with 260×128 pixel resolution. There are six fixed push buttons of the piezo-electric type – located under the display window. Four of the buttons changes dynamically depending on the current phase of a purchase or information retrieval and two of them are always set to Accept or Cancel, which gives an easy to use interface. The current function of a key is indicated by an adjacent caption or instructive text in the display.

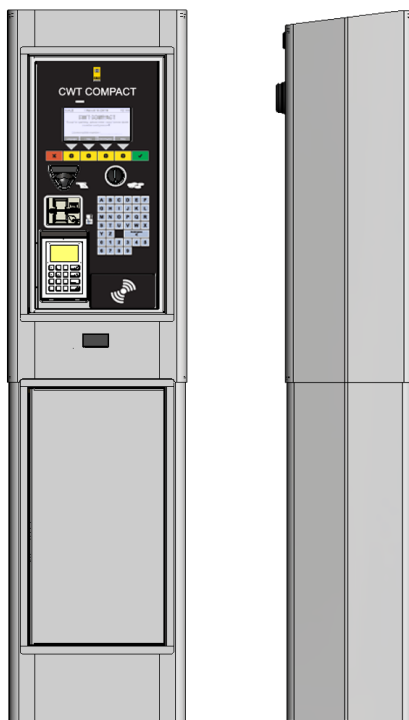


Figure 1. CWT Compact with keyboard

The information panel surrounding the display is customizable with regards to background color, button design and the design of other symbols. The surface can also contain instructions and advertising elements.

The CWT Compact with keyboard also has an alpha-numeric piezo-electric keyboard positioned below the six other buttons. Behind the visible keyboard there is a fixed grid of piezo-electric switches, and the function of each switch is fully programmable. The visual keyboard is printed on the information panel and is therefore fully customizable with regards to key legends, colors, etc.

3.2 Data communication

3.2.1 Cale WebOffice 2 (CWO 2)

Cale WebOffice 2 is a back-office service for remote management of your terminals and for financial and statistical purposes. The CWT communicates with CWO 2 via GSM/GPRS or LAN using the TCP/IP protocol.

3.3 Payment

The CWT terminals support different means of payment and a number of payment applications.

3.3.1 Means of payment

COINS

The CWT Compact supports coin payment. The terminal uses various techniques for rejecting and disposing of foreign objects and not accepted coins. The coins used for payment are collected in a coin box that needs to be emptied or replaced on site.

CARDS

Credit cards, debit cards, contactless cards, smart cards and hybrid cards are supported by various card reader configurations.

Cale Access offers card services for different types of card and markets, even integrated card solutions with direct access to a bank and chip card solutions. Contact Cale Access regarding card applications and card services.

3.3.2 Payment applications

Currently the CWT offers pre-payment, that is, the user pays in advance and receives a ticket.

A special pre-payment application is *Code Payment* which requires that the user enters a code or number, for instance a license plate number. The user pays at the terminal using an available payment option.

3.4 Transaction processing

Purchase data can be stored in a non-volatile memory device inside the CWT, but in some card payment applications the data is immediately transferred to an external source, such as CWO, without being stored anywhere inside the terminal.

Coins have to be collected on site by emptying or replacing the coin box.

Collection of card purchases can be done either on site by means of a memory device such as a USB stick, or the data can be transferred automatically to the CWO database on a regular basis where the operator can process the data in a number of ways.

3.5 The service menu

The service menu is shown as the CWT switches into service mode when you open the cabinet door. The numerous options in the service menu let you:

- Change terminal settings.
- Export and import terminal settings.
- Update the terminal's software and firmware.
- Export credit card transactions, etc.

Most of the functions available in the service mode can, however, be performed more conveniently through the CWO Service.

The terminal exits the service mode when you close the door again. The printer produces a printout showing the software and firmware versions installed in the terminal and numerous data regarding the printer, including the current printer settings. This lets you check any changes you have made while in the service mode.

For a detailed description of the service menu see *CWT Software Configuration Handbook*.

3.6 Mechanical design

3.6.1 General

The cabinet can be detached from the base and this is the way the CWT Compact is usually delivered from the factory.

The cabinet can be removed from the base at a later stage, for example for maintenance or upgrading reasons, or if the terminal is to be taken out of operation for a lengthy period.

The configuration of the CWT Compact is highly flexible and varies depending on installed pay units etc.

3.6.2

Door locks

The standard lock in the CWT Compact is a mechanical Exec lock from Assa Abloy. It is a mechanical lock that is opened with a key (see Figure 2). The lock can be protected against dirt and water by two flaps that slide apart when the key is inserted (option).

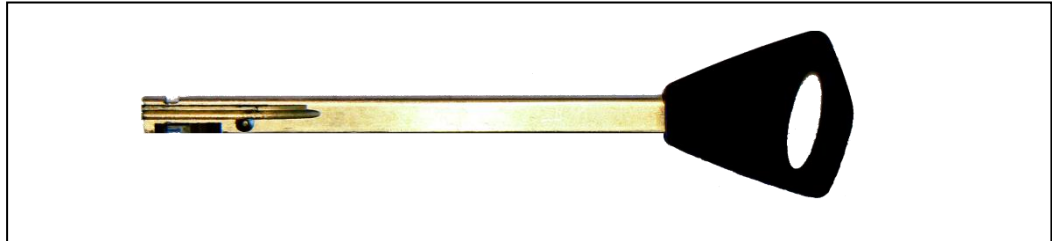


Figure 2. Common door key.

The CWT Compact terminals also have an optional electronic lock system with online central administration and authorization via Cale WebOffice. This solution replaces the expensive and tedious handling and administration of keys because all persons that need access to a CWT Compact use the same type and version of door key (see Figure 3) that is more to be seen as a door opening tool.



Figure 3. Common door key.

There is a round key hole at the right side of both the cabinet and the base.

The inside of each hole is covered by a protective plate. To enable the insertion of a key, this plate will automatically move out of way if these conditions are met:

- You are registered as a user in Cale WebOffice and have been given the proper privileges for access times, opening frequencies, compartment (cabinet, base or both), etc.
- You identify yourself by inserting an access card in the card reader and entering an optional PIN code at the keyboard (CWT Compact with keyboard). In CWT Compact without keyboard and in terminals without a card reader, you place a special ID card against an RFID reader mounted in the plastic casing in the right bottom corner.

The electronic lock system also provides an opening alternative in case of power failure, software failure or communication disturbances. Inside the electronic lock there is a regular lock as well. A mechanical master key (see Figure 4) is used for emergency access, but the protective plate has to be pushed up manually first by means of a small screwdriver, paper clip, or similar.

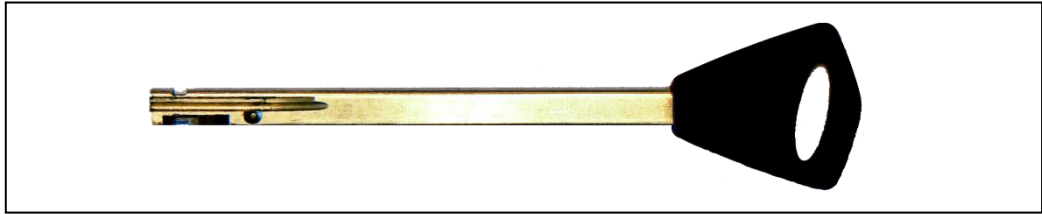


Figure 4. Master key.

Each door is secured in closed position by means of four locking latches.

NOTE! — After you have opened the upper door the lock will be closed again after a 15 s timeout to save power. Because the terminal now is in the service mode you cannot prove your identity and get the necessary privilege to open the door again. Instead you have to press an *Open Upper Door* key shown in the start page of the service menu to open the lock mechanism again. The base door lock also has a 15 s timeout, but you can still run the normal application with the upper door closed and open the lower door lock as usual.



Figure 5. Electronic-locking mechanism.

The upper and the lower E-locks are of the same type. There is a DIP-switch whose setting tells the system if the lock is mounted in the cabinet or base, see configuration below.

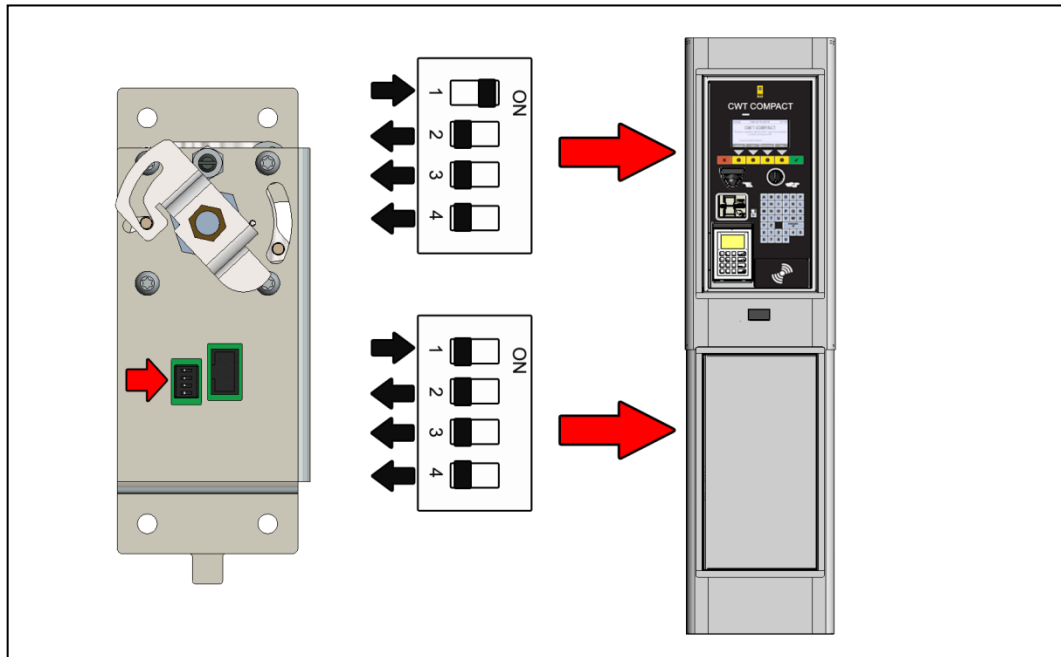


Figure 6. E-lock DIP switch settings

3.6.3 Door-open sensors

Both doors have a door-open sensor. All attempts to open the terminal are logged in the CWT and the information is transferred to Cale WebOffice.

The door-open sensor consists of a permanent magnet mounted on the door and a magnetic field sensitive sensor mounted inside the door frame.

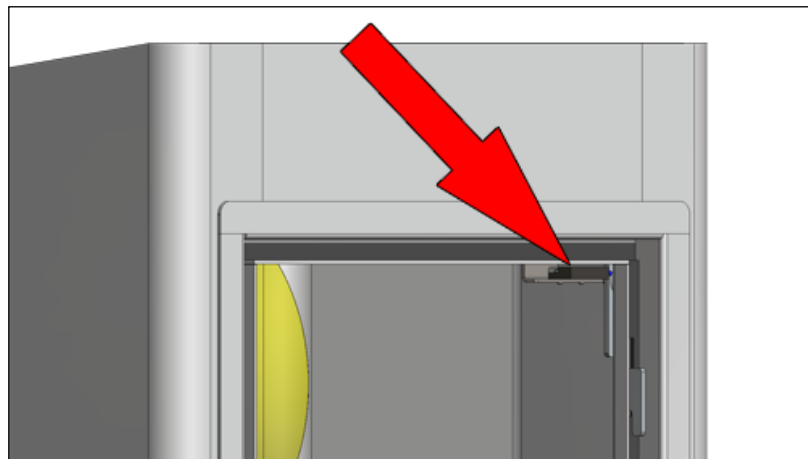


Figure 7. Door-open sensor in the cabinet.



Figure 8. Door-open sensor in the base.

3.6.4 Inside the cabinet

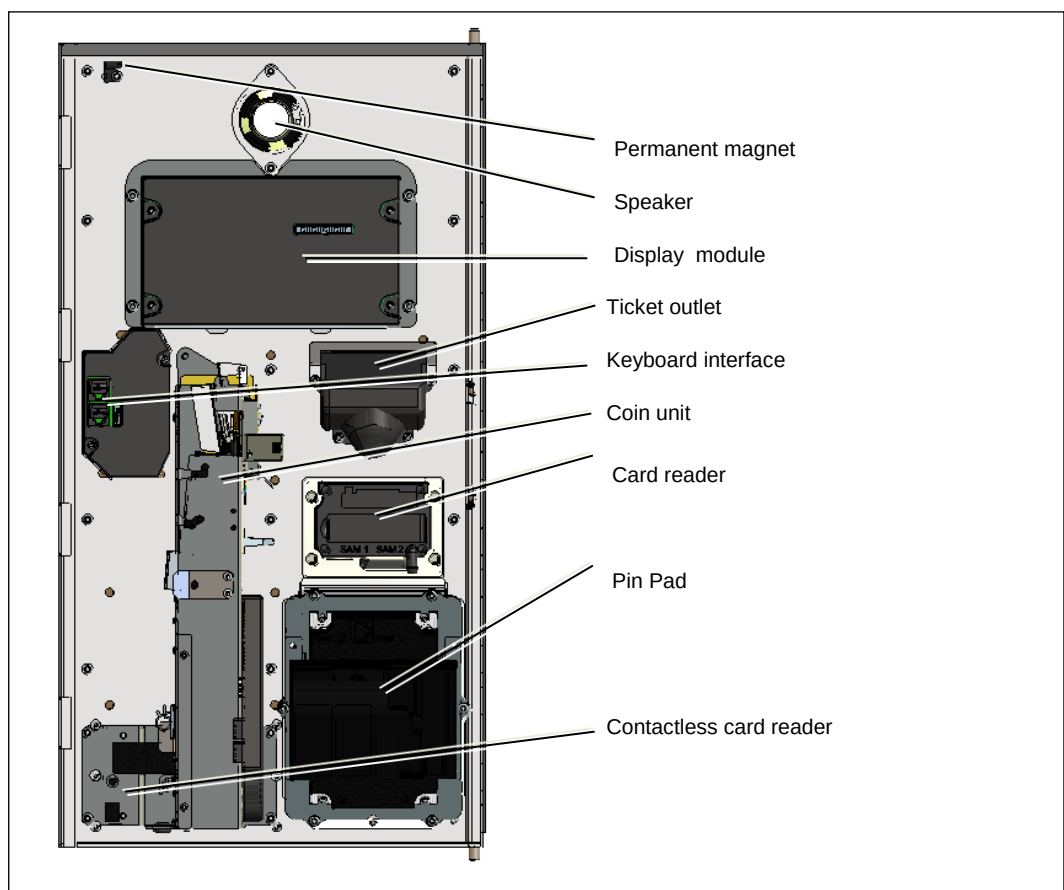


Figure 9. Door interior.

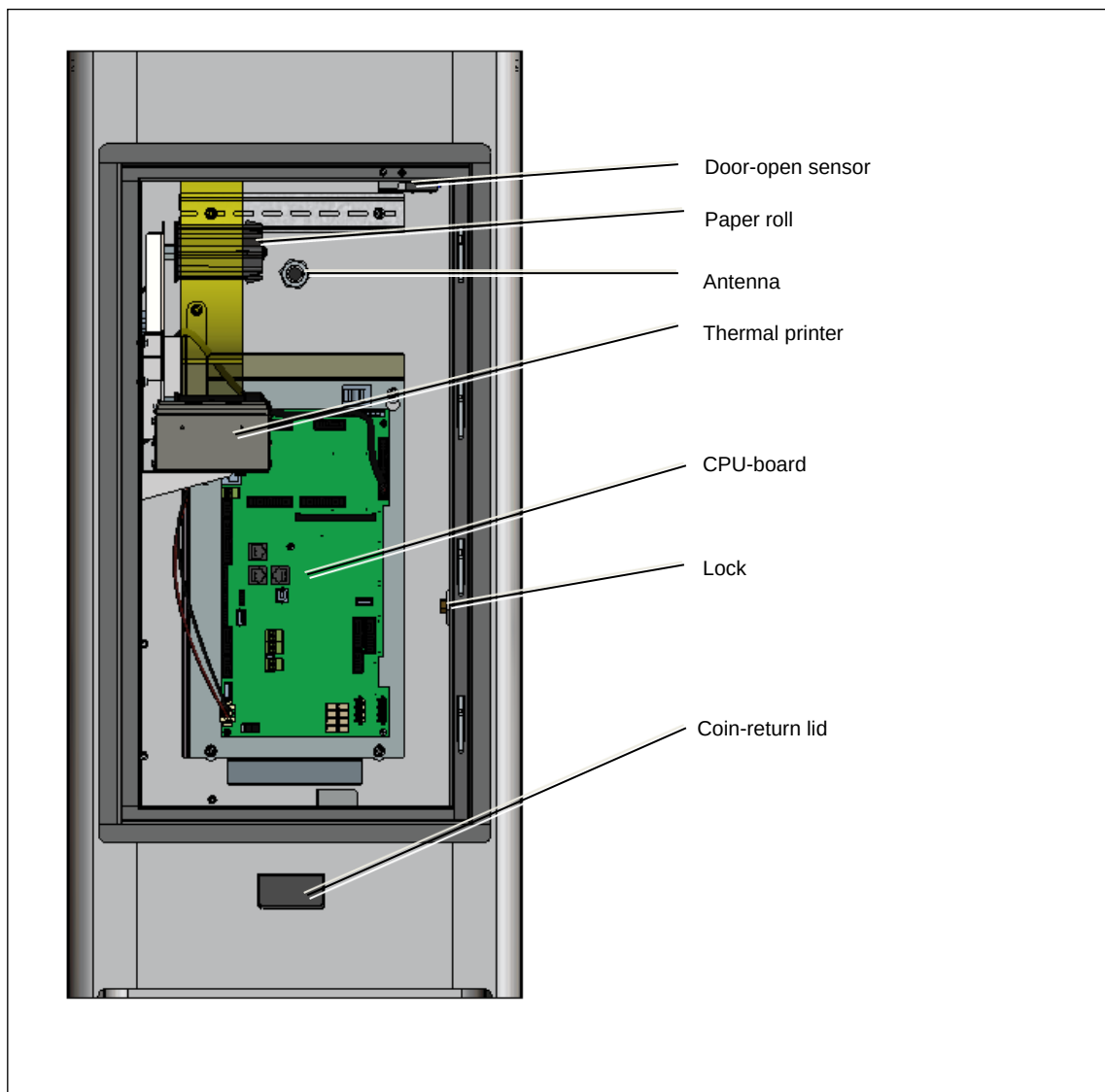


Figure 10. Cabinet interior.

The items found inside the cabinet vary between the CWT Compact models and between different versions of each model. The above figure shows a CWT Compact model equipped for payment with coins and credit cards. The receipts are supplied from a paper roll.

3.6.5

Inside the base

The contents of the base may vary depending on local regulations, needs for specific electrical components, etc.

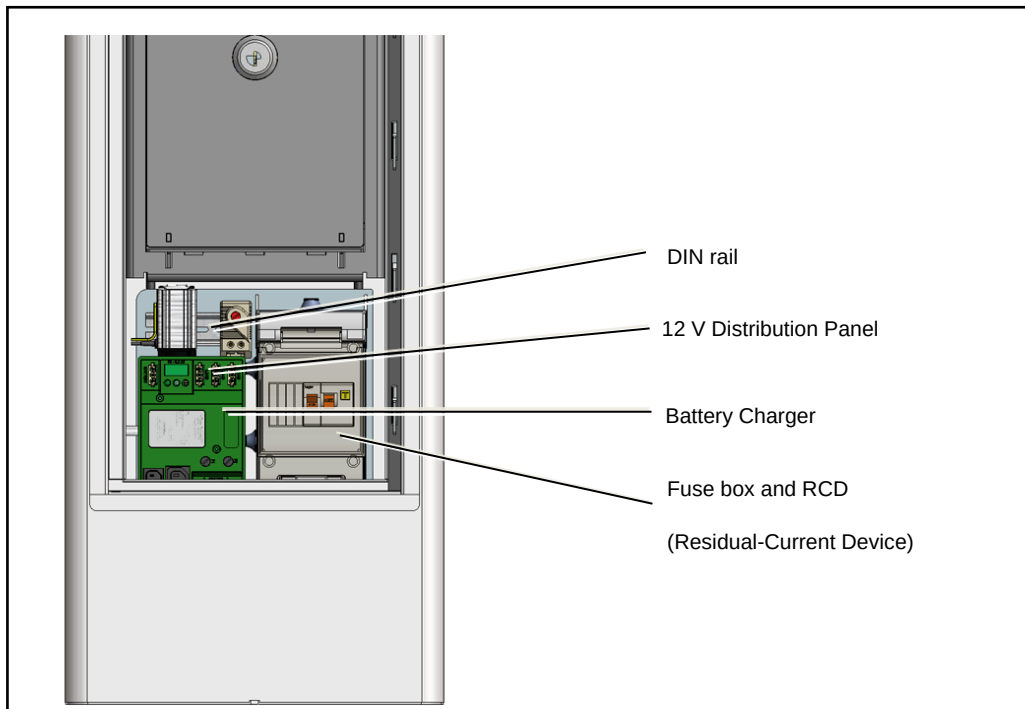


Figure 11. Base interior (example).

COIN BOX VAULT

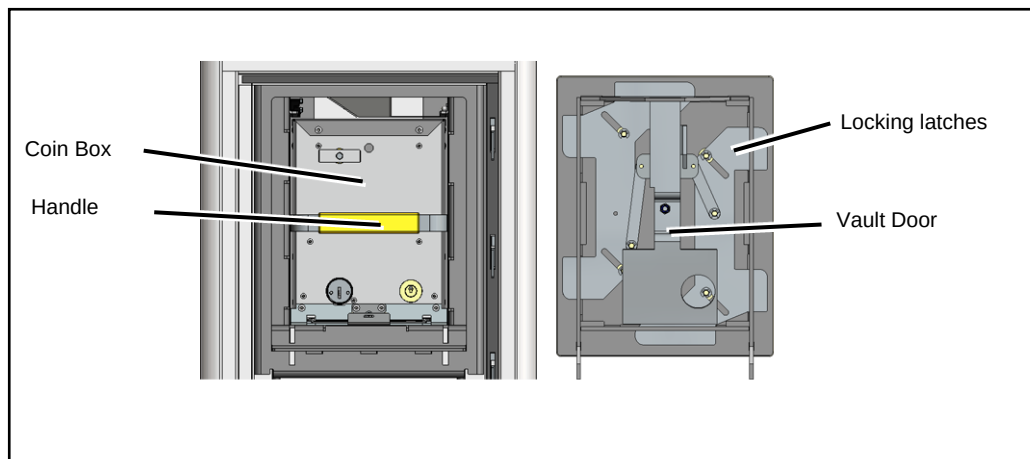


Figure 12. Vault interior.

The coin box vault is made of 4 mm sheet metal with side drilling protection.

The vault door, made of 6 mm armoured steel, has six drilling protected locking latches along its edges.

The coin box vault door lock, placed inside a drilling protected and anti-bolster fitting, is of a high security mechanical type such as Kaba or any of the Abloy locks Guard-x, Exec and Protec. All of them use a key profile that can only be obtained from the original lock manufacturer. The key does not have any serrated surfaces neither any sharp or pointed edges. Registered locks and keys are available.

The key can only be removed when in the locked position. It is impossible to close the outer base door until you have locked the vault door and removed the key.

When collecting the coins you can pull out the coin box and let it rest on top of the vault door before you start lifting the box.

When open, the lowered vault door can easily be lifted away from the vault for repair or replacement. No tools are required for this.

COIN BOX

Seen from outside in, the coin box is protected by the base and the coin box vault.

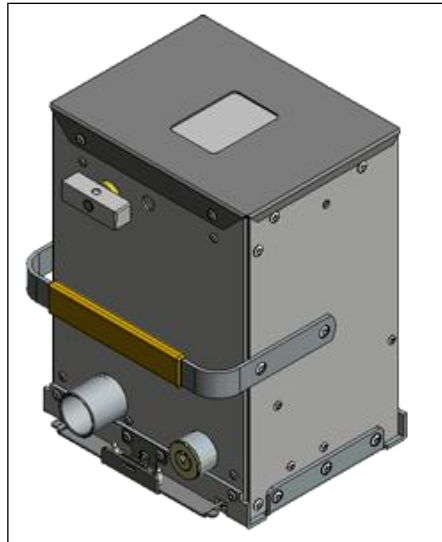


Figure 13. Coin box.

The coin box has 4.6 l capacity. A presence sensor and software detection of when the box is *near full* and *full* is also built into the system.

Coin collection personnel must have the proper access privileges to be able to open the base door. All access attempts are logged in CWT Compact and are transferred to the Cale WebOffice management system.

All structural joints on the coin box are riveted or welded. Screw fittings are not used. This reduces the risk of anyone breaking into the coin box without leaving any traces.

PRODUCT LABEL

The figure below describes the information shown on the product label attached inside the cabinet.

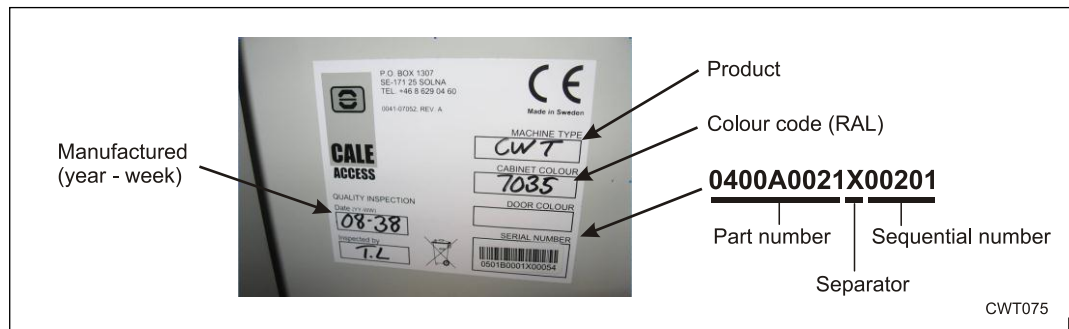


Figure 14. Product label.

3.7 Power supply alternatives

CWT Compact terminals are powered by a lead-acid battery placed in the pedestal of the terminal. The battery is charged by mains power or solar power. In the latter case the terminal has a solar cell panel mounted at the top.

Alternatively the terminal can be powered from the battery only which requires regular battery replacement. An alternative is to have the battery charged from a power source that is regularly available, such as a street light post.

3.8 Administrative tools

Cale Access supplies programs and services for credit card administration, collection, terminal maintenance, etc. Contact Cale Access or your nearest Cale representative for more information. You are also welcome to visit www.calegroup.se for details.

3.9 Cash collection system

Cale Access AB provides a complete system for secure collection and transport of coins. With this system the coins will never be displayed at any stage of the collection process. Contact Cale Access or your local Cale representative for more information. An alternative source of information on this matter is www.calegroup.se.

4

FUNCTIONAL DESCRIPTION

The *CWT Software Configuration Handbook* contains detailed information regarding functions that can be used via the service menu.

4.1 Operator controls

All CWT Compact models have a graphical display and software controlled buttons.

4.1.1 CWT Compact without keyboard

The CWT Compact without keyboard has a monochrome graphical 148×73 mm display with 260×128 pixel resolution. There are four fixed software controlled push buttons of the piezo-electric type under the display window. The function of the buttons changes dynamically depending on the current phase of a purchase or information retrieval. The current function of a key is indicated by an adjacent caption or instructive text in the display. The **ACCEPT** and **CANCEL** are located on each side of the four software controlled buttons.

The information panel surrounding the display is fully customizable with regards to background color, button design and the design of other symbols. The surface can also contain instructions or advertising elements.

4.1.2 CWT Compact with keyboard

The CWT Compact with keyboard has the same type of display and push buttons as the CWT Compact without keyboard model.

However, the CWT Compact with keyboard also has an alpha-numeric piezo-electric keyboard positioned below the display (up to 48 buttons). Behind the visible keyboard there is a fixed grid of piezo-electric switches, and the function of each switch is fully programmable. The visual keyboard is printed on the information panel and is therefore fully customizable with regards to key legends, colors, etc.

4.2 Coin system

The card and coin payment systems work independently from each other. Should one payment unit be out of order for some reason, the other payment unit will remain operable. A message in the display informs the customer about available payment methods.

The coin system consists of the coin unit in the cabinet and the vault with its coin box in the base.

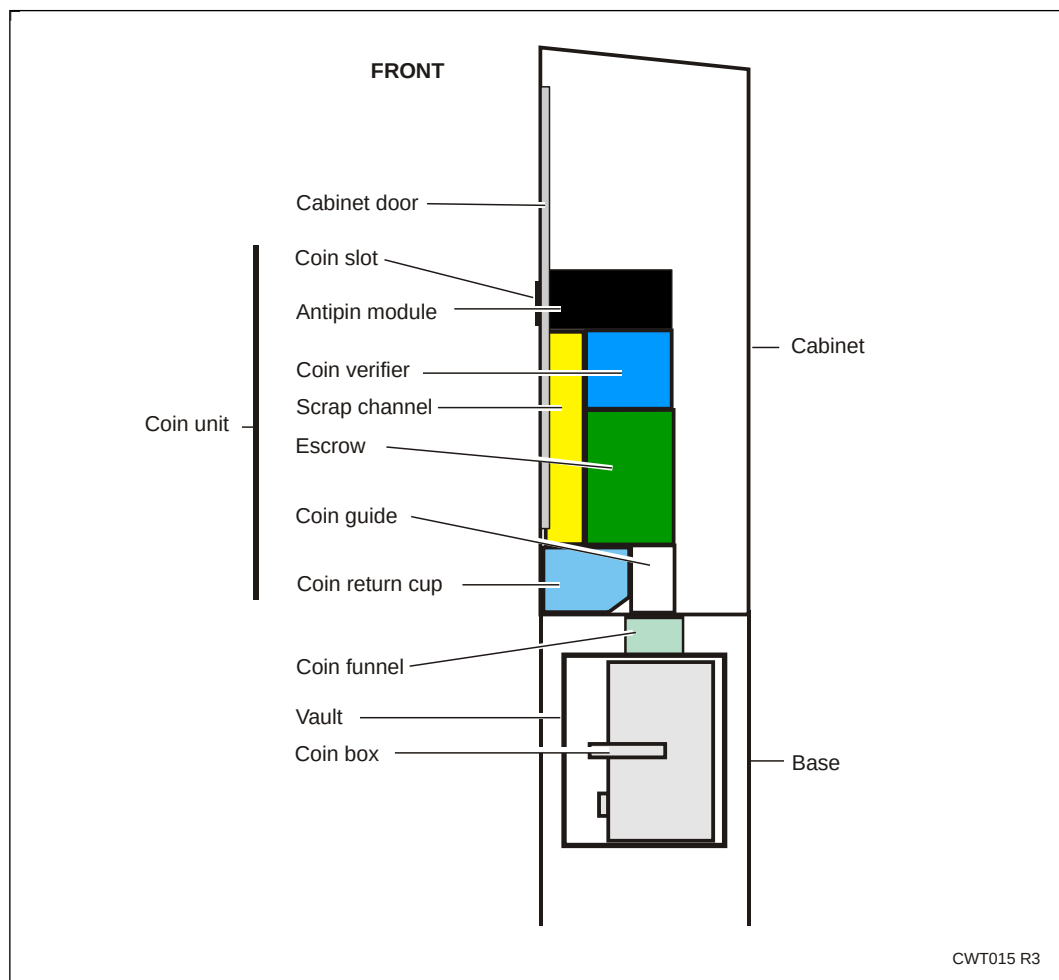


Figure 15. Coin system.

The coin unit is designed as a module that is fitted at the back of the cabinet door by means of two key holes. The module is secured with two screws that only need to be loosened slightly when the module is to be removed.

4.2.1 Antipin module

The function of the antipin module is to prevent external manipulation of the coin system. The figures below illustrate the function principles of the antipin module. The mechanism is seen from above.

The antipin module has a pair of metal-detector coils just inside the coin slot opening. A bit further in there is a barrier plate that usually covers the coin slot. The barrier plate is pulled into closed position by a tension spring.

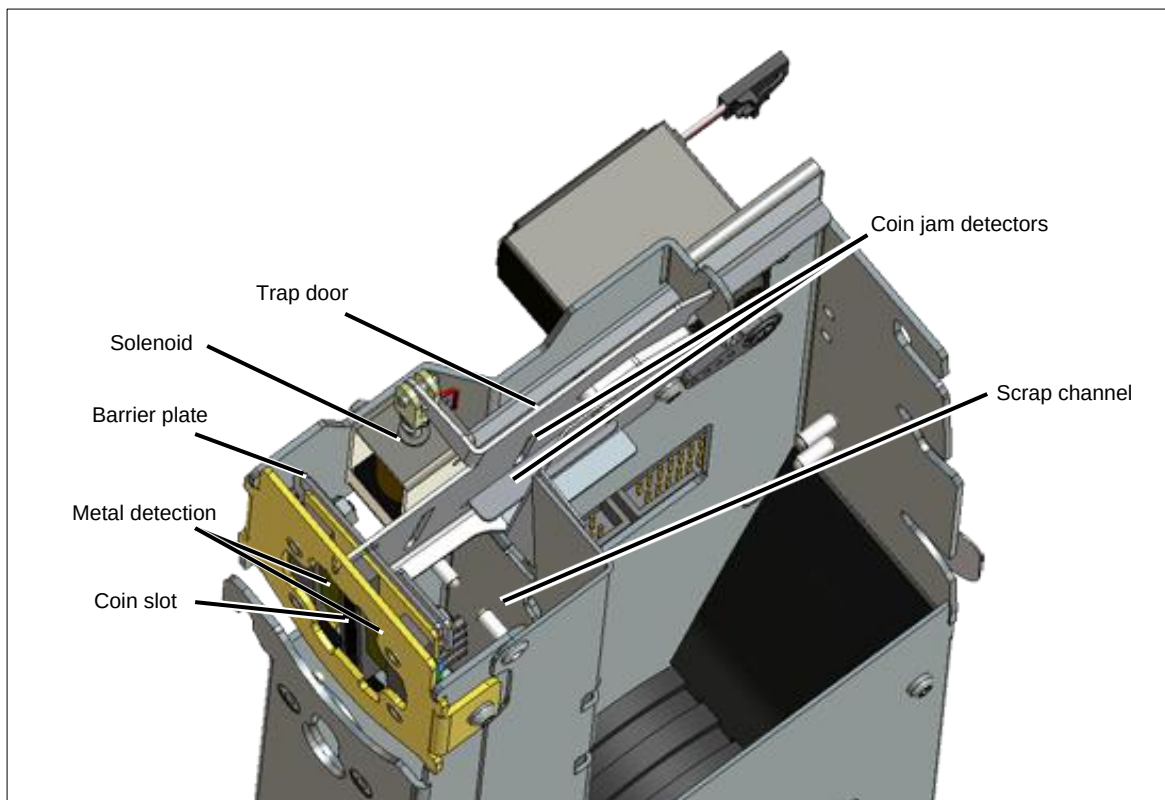
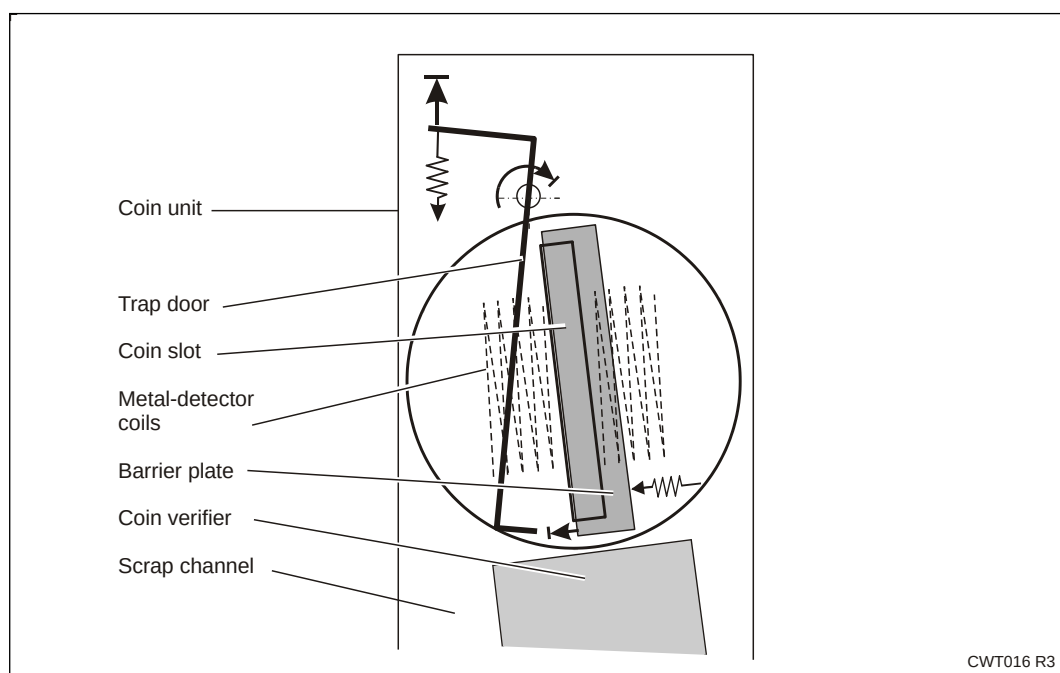


Figure 16. Antipin module (in closed position).

A slightly inclined trap door, operated by a solenoid plunger, is held in opened (clock-wise) position by a permanent magnet inside the solenoid across which no voltage is currently applied (the above figure shows the trap door in its closed position).

Figure 17 illustrates the mechanism in idle mode before any metal object is detected in the coin slot. The barrier plate is kept closed by a compression spring and the trap door is in the open position.



CWT016 R3

Figure 17. Antipin in idle mode. The barrier plate covers the coin slot opening and the trap door rests in open position.

When a metal object is detected by the detector coils, a voltage is temporarily applied across a separate coil in the solenoid which generates a magnetic field that repulses the field of the permanent magnet. The trap door now rotates anti-clockwise pulled by a tension spring mounted on the solenoid plunger. The trap door also forces the barrier plate to the right to allow the metal object to be fully inserted. See Figure 18.

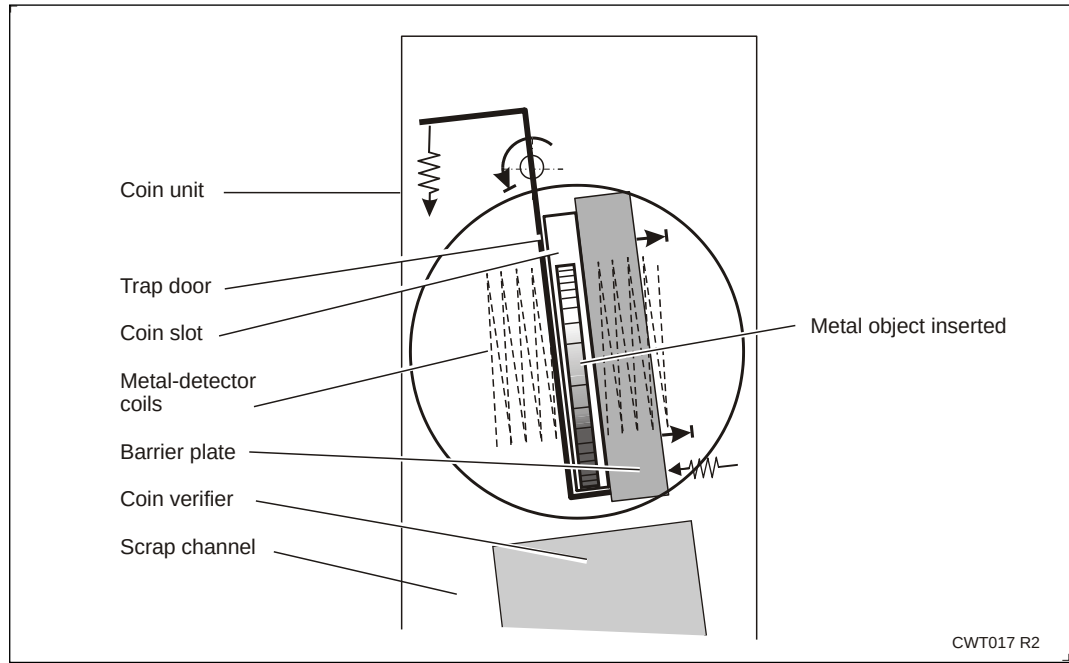


Figure 18. Barrier plate, and thus the antipin module, opens for metal objects.

The almost vertical trap door has a perpendicular shelf at its lower edge. This shelf slopes downward and rearward toward the coin verifier. A round metal object will roll along the shelf and fall into the coin verifier. A metal object that cannot roll will fall into the scrap channel as the trap door is swung clock-wise by the solenoid after a pre-set time delay (see Figure 19).

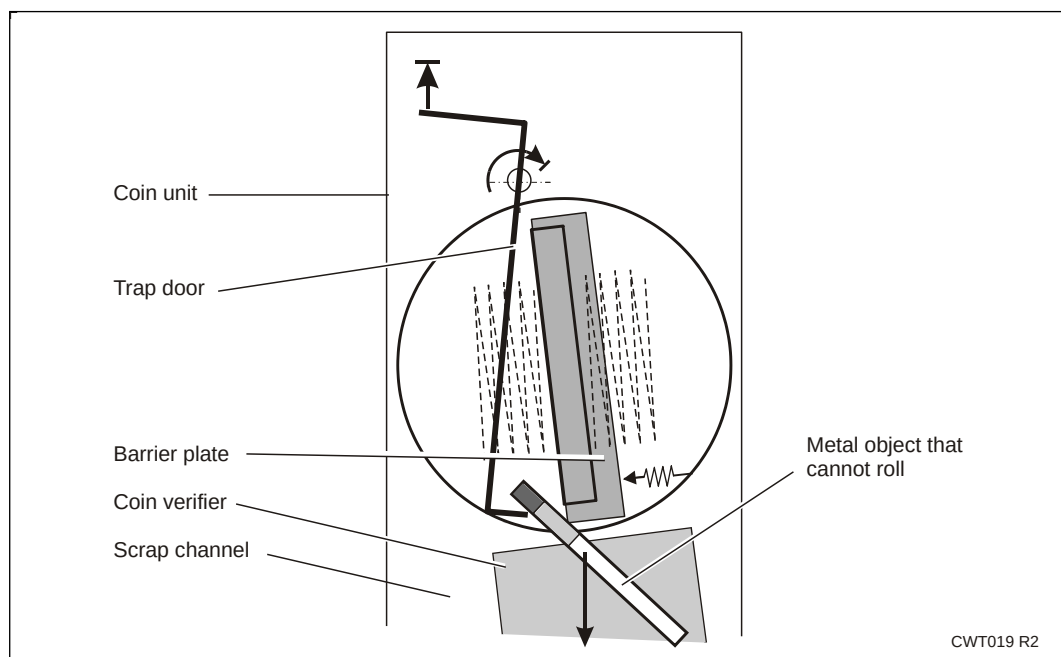


Figure 19. Non valid metal objects are scrapped.

The permanent magnet in the solenoid module will keep the trap door in open position and thus no voltage needs to be applied to the solenoid continually which reduces the power consumption.

As the trap door opens, the compression spring will close the coin slot by pushing the barrier plate to the left.

If an object, or part of an object, remains in the coin slot opening as shown in, Figure 20 the barrier plate will stop against this object but will close as soon as the object is removed.

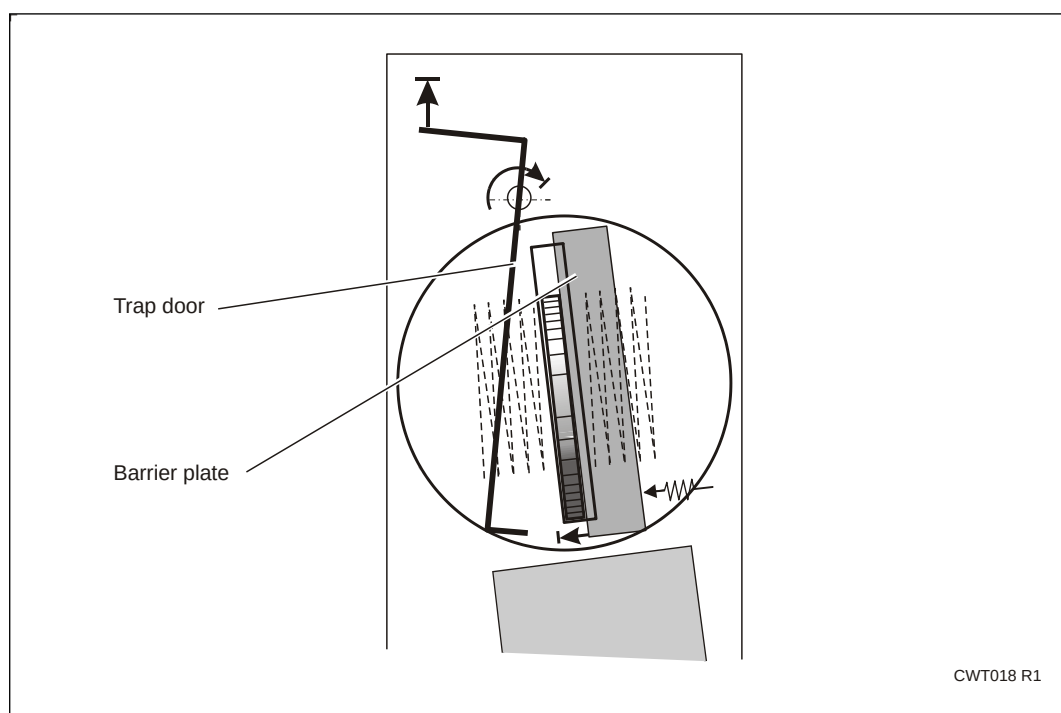


Figure 20. Metal object stuck in the coin slot.



IMPORTANT! — The function of the coin system may be interrupted if the terminal leans too much in any direction.

If an object, or part of an object, is inserted and prevents the trap door from closing, this will be detected. The coin system will try to remove the object, if it doesn't succeed the terminal will send an alarm to CWO.

4.2.2

Coin verifier

The coin verifier reveals whether invalid coins have been used. The verifier also includes sophisticated electronics for determining what type of coin is passing.

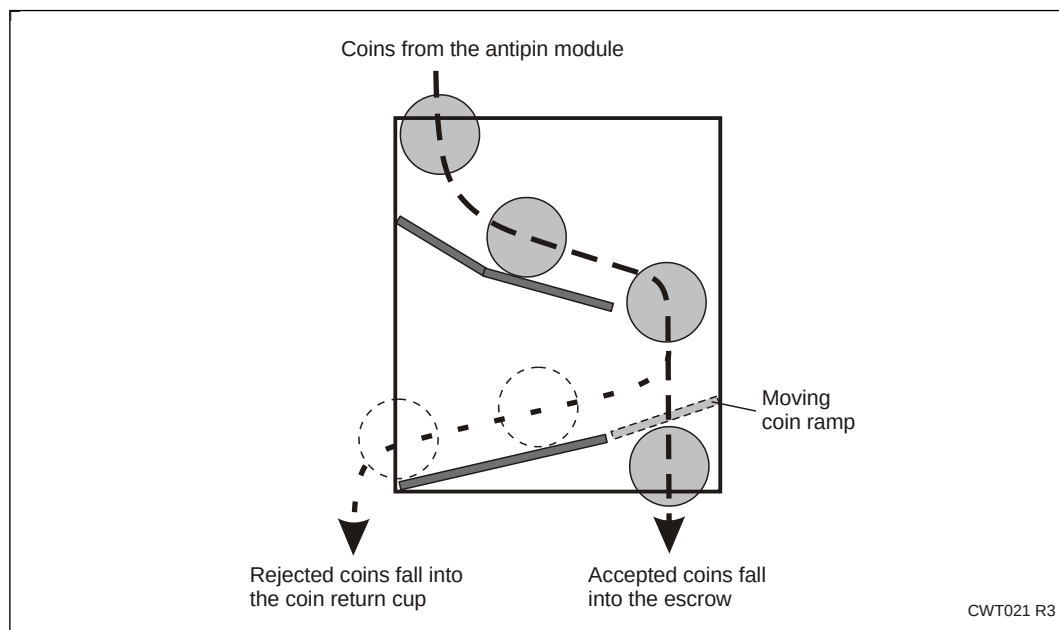


Figure 21. Coin verifier checks that a coin is valid and determines its type.

If a coin is valid, the movable coin ramp moves out of the way so the coin falls into the escrow. If the coin is invalid, the movable coin ramp guides it, via the scrap channel, into the coin return cup instead.

On the right side of the coin verifier (as seen from the terminal's front) there is a lid.



Figure 22. Coin verifier lid opening mechanism in closed position.

4.2.3

Escrow

The task of the escrow is to store the inserted coins until the customer accepts or cancels the purchase. Accepted coins are guided into the coin box. Cancelling the purchase empties the coins into the coin return cup. The volume of the escrow is approximately 0.35 l, equal to about 120 coins.

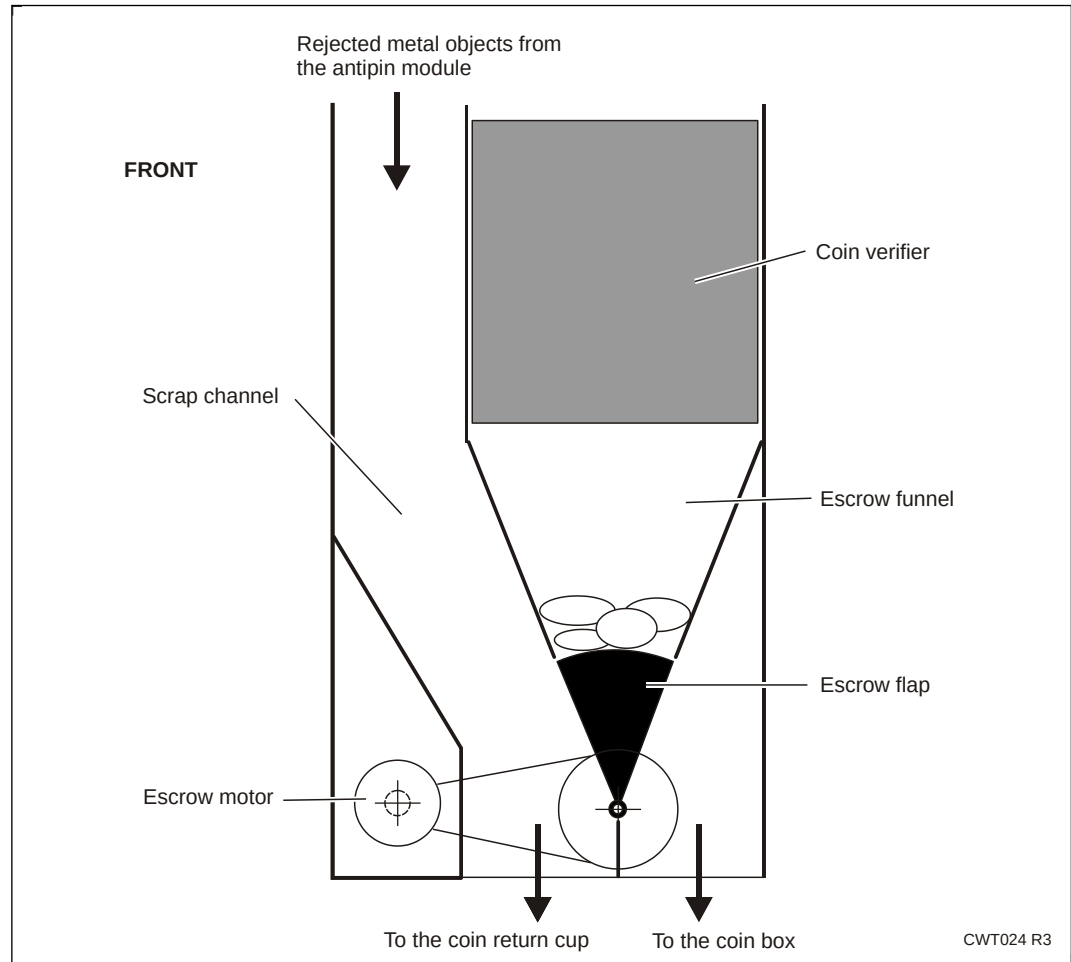


Figure 24. Escrow in home position.

The figure above shows the coin unit as seen from the terminal's right side.

To the left is the scrap channel through which any objects rejected by the antipin module or the coin verifier will fall into the coin return cup.

Below the coin verifier is the escrow that consists of a funnel, a flap and a DC motor (escrow motor).

The flap can be rotated to the left or right by the motor via a toothed belt and a pulley attached to the flap. The pulley has a small permanent magnet mounted close to its outer edge. There is a printed circuit board, named *coin handling board*, mounted on the left side of the coin system module (not shown in the above figure). This board has three Hall-effect sensors that detect the position of the permanent magnet, and thus the position of the pulley and the flap.

Figure 24 shows the escrow flap in home position, that is, the position it has until the customer either accepts or cancels the purchase. Any inserted coins remain inside the escrow funnel.

In Figure 25 the customer has accepted the purchase and the escrow motor have turned the flap to the *Accepted Purchase* position. The coins fall into the coin box.

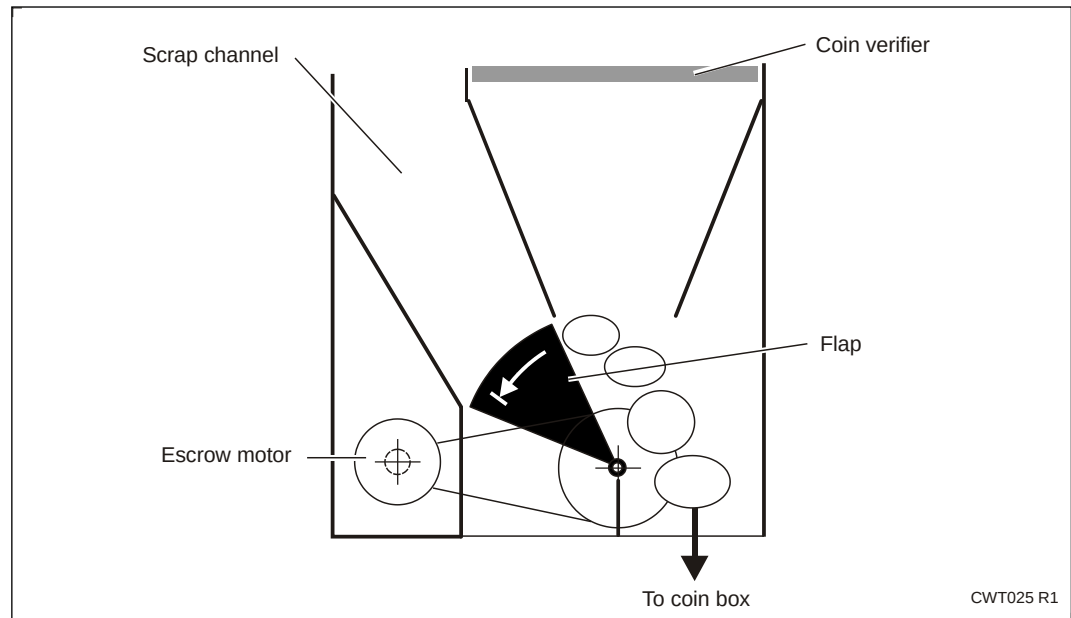


Figure 25. Escrow in Accepted Purchase position.

In Figure 26 the customer has cancelled the purchase and the escrow motor has turned the flap to the *Cancelled Purchase* position. The coins fall into the coin return cup.

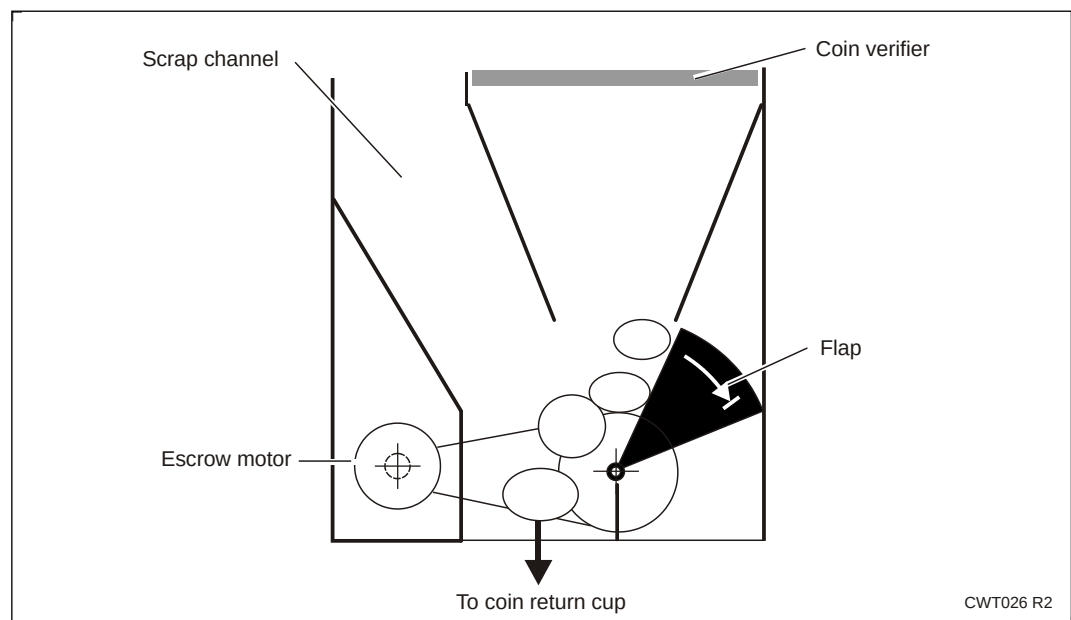


Figure 26. Escrow in Cancelled Purchase position.

4.2.4 Coin handling board

A PCB assembly named **Coin Handling Board** is mounted on the left side of the coin unit.

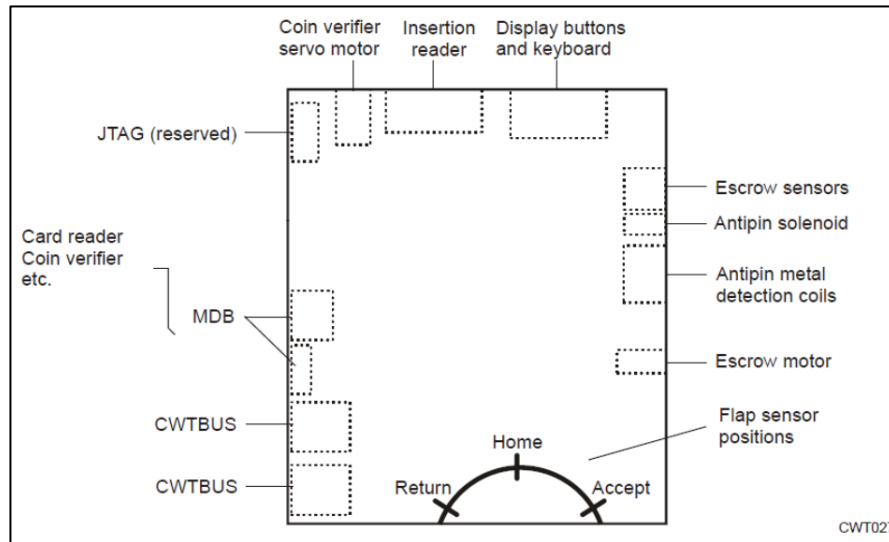


Figure 27. Coin handling board as seen from the solder side.

The coin handling board, with its own AVR (micro controller), controls the functions of the coin system module. The board, which connects to the CPU board via the CWT BUS, also serves as an interface between the display buttons in CWT Compact and an optional card reader. The AVR firmware can be updated using a PC.

A screen print at the bottom of the board indicates the position of the flap sensors mounted on the component side. The sensors are affected by the tiny permanent magnet fitted on the flap pulley.

4.2.5 Coin box

Removing the coin box actuates a micro switch mounted inside the vault.

For security reasons, the design of the coin box is not described in detail in this manual. For operation and maintenance instructions, see Section *Changing and emptying the coin box*.

4.3 Card payment system

4.3.1 Card readers

CWT Compact terminals offer the possibility to pay with credit/debit magnetic stripe cards and smart cards (chip cards).

The card and coin payment systems work independently from each other. Should one payment unit be out of order for some reason, the other payment unit will remain operable. A message in the display informs the customer about available payment methods.

The standard card reader in CWT Compact is a hybrid reader capable of reading all track-2 ISO payment magstripe cards (common credit/debit cards) and ISO smart cards (chip cards). The reader requires manual card insertion and retraction of the card which enables the customer to remove the card if the terminal or transaction fails. It is also possible to install a card reader solutions to be used with certain chip card applications, such as EMV2. The reader automatically detects if an inserted card is a magnetic card or a chip only card and the card functions are adapted accordingly.

4.3.2 Credit/debit card verification

To verify that a card is valid, the card number is evaluated according to prescribed rules before being checked against a blacklist containing non valid card numbers.

4.4 Print system

CWT Compact terminals are equipped with a thermal printer using direct thermal printing to generate characters, symbols and graphics.

Both landscape and portrait orientation are supported. The document length is 70 – 100 mm. Paper loading is automatic and both full and partial cutting is supported but partial cutting cannot be combined with preprinted black marks. There is a translucent sensor for preprinted black marks used for precise positioning of printing and cutting.

The printer module consisting of the printer and the paper supply roll are positioned on a vertical main assembly plate that can easily be removed. The printer itself is held in position by means of key holes and a locking latch. See *Figure 34*.

The printer is connected to the CPU board via a USB interface. The USB cable can be disconnected without switching OFF the terminal in beforehand.

The printer firmware can be updated via Cale WebOffice.

4.4.1

Thermal printer

This section describes the printer exterior and the function principles. See the *CWT Software Configuration Handbook* for information regarding all other aspects of printer control and printer settings.

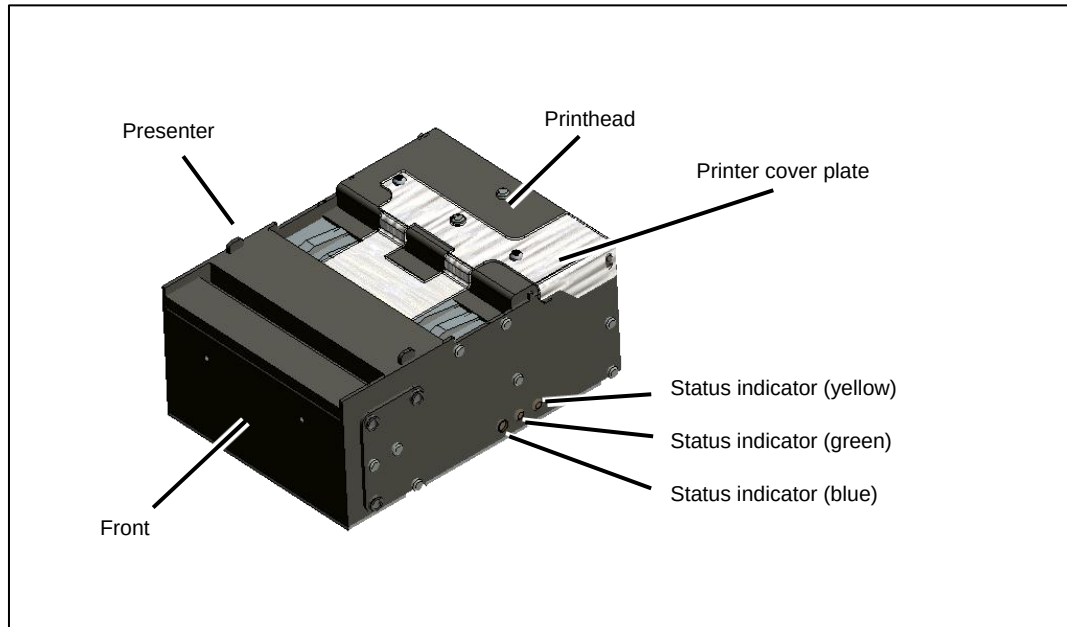


Figure 28. Printer, front view

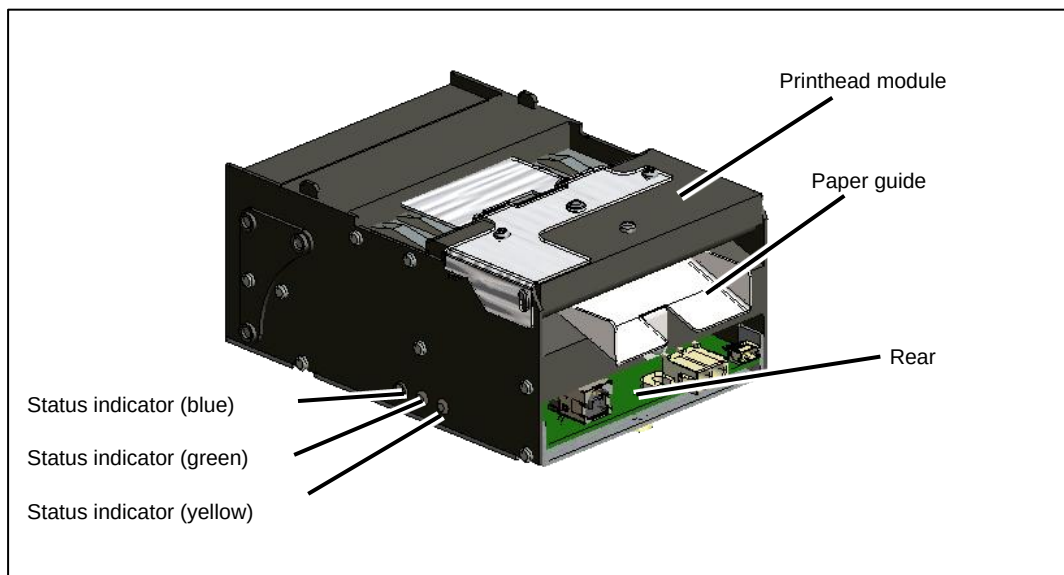


Figure 29. Printer, rear view.

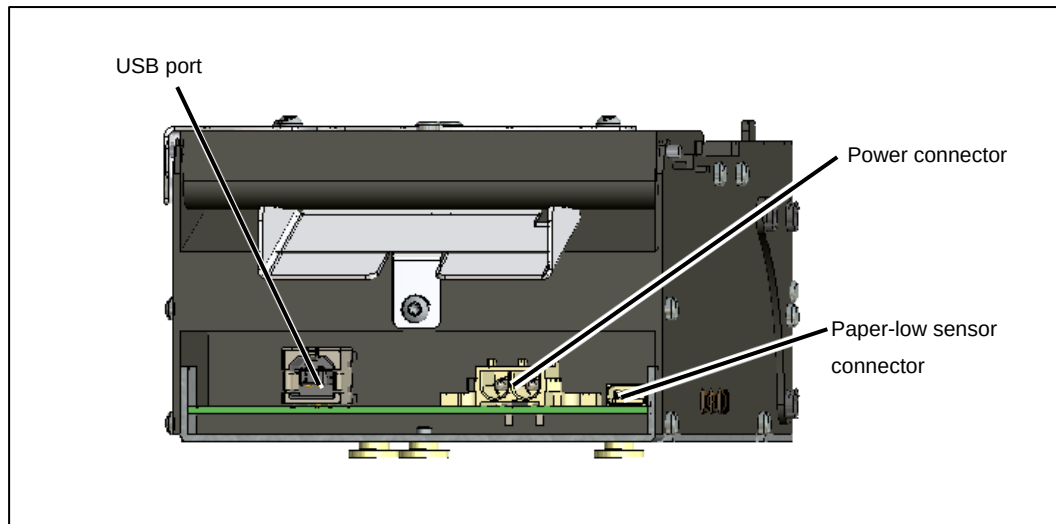


Figure 30. Printer connectors.

The print speed can be changed for optimal print quality and power consumption. The presenter speed needs to be changed accordingly as described in the *CWT Software Configuration Handbook*.

The printer supports 0.054–0.11 mm paper thickness (55 – 110 g/m²) including self-adhesive.

PRINT HEAD

The print head module can easily be opened for operator access to the paper path and the print head for maintenance purposes.

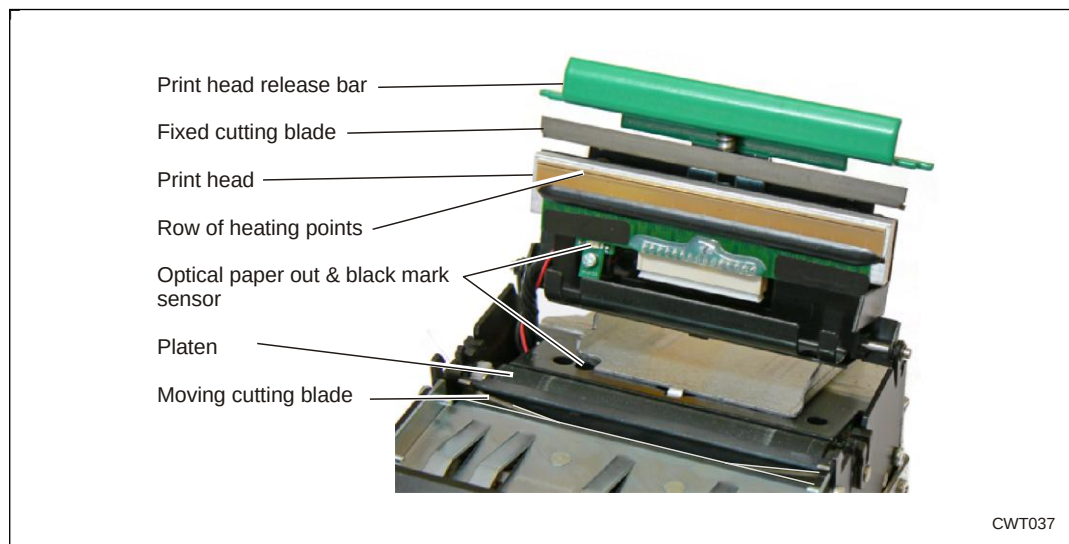


Figure 31. Print head in raised position.

The print head consists of a ceramic plate with a large number of heated points positioned in a line perpendicular to the feed direction of the paper. When a point is heated, it warms the heat-sensitive top layer of the paper to a temperature above 70 °C which develops a black or blue dot (depends on the type of paper used).

Print speed, number of burn pulses and burn time can be adjusted for optimal print result. See *CWT Software Configuration Handbook*.

SENSORS

The printer has a number of physical sensors but their function can vary depending on when, in the print cycle, the sensor is activated.

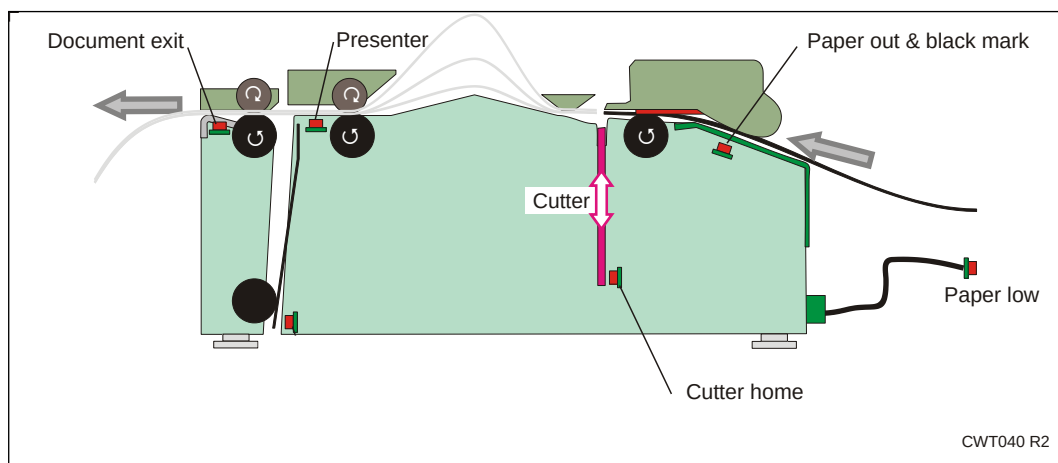


Figure 32. Sensors.

Physical sensor	Function
Paper low	Input connector for the external paper low sensor.
Paper out / Black mark	Detects paper presence and black marks. Translucent sensor. If the documents have pre-printed information, for instance a logotype, each document usually also have a pre-printed black mark for exact positioning of the printed elements and the cutting. Because the combined paper out and black mark sensor lights through the paper, it will detect a black mark irrespective of which side of the paper that has the black mark. If the length of the detected black area exceeds the set <i>maximum black mark length</i> value by 5 mm this is interpreted as out of paper.
Cutter home	Cutter mechanism in home position.
Presenter	Document presence in presenter area.
Document exit	Document presence / Document taken.

Based on the status of the sensors the printer can determine if there is a paper jam, for instance in the paper entrance or presenter region.

FEED BUTTON

The  **blue feed button** has several functions:

- Pressing and releasing the button will feed, and present any data in the print buffer. If the buffer is empty a self-test will be printed showing version and date of the firmware, control board revision, serial number, name of loaded fonts and logotypes and the parameter settings.
- With paper removed from the printer, pressing and holding the feed button down while closing the print head will make the printer enter a top-of-form sensor calibration mode. The green status indicator should change from blinking to steady light. Insert paper into the printer within 6 s as described in section *Loading paper*. The printer should start feeding the paper back and forth to calibrate the black-mark sensor.



STATUS INDICATOR

The  **yellow status indicator** has several functions.

- **Constantly ON** — The printer is operational
- **Flashing rapidly** — Indicates an error. Hold down the feed button and the number of blinks will reveal the type of error.

<i>No. of blinks</i>	<i>Error</i>
1	Presenter jam. Paper cannot be ejected or retracted.
2	Cutter cannot return to home position.
3	Out of paper.
4	Print head lifted.
5	Paper feed error (below print head).
6	Print head temperature exceeds 60 °C.
7	Presenter jam. Motor cannot rotate.
8	Paper jam during retract.
11	Black mark calibration error.
Rapidly flashing	Checksum error during firmware loading.
Steady light	Wrong firmware type or target detected at firmware loading.
2 blinks – pause – – 2 blinks	Paper low.

Error indication is reset

- When the error condition is removed.
- Next time the power is switched ON.
- When the print head is lifted and then lowered.

POWER INDICATOR

The  **green power indicator** is ON when 24 V is connected accordingly to the printer.

PRINTER MOUNTING

The printer is mounted on a shelf and secured by means of key holes and a locking latch.

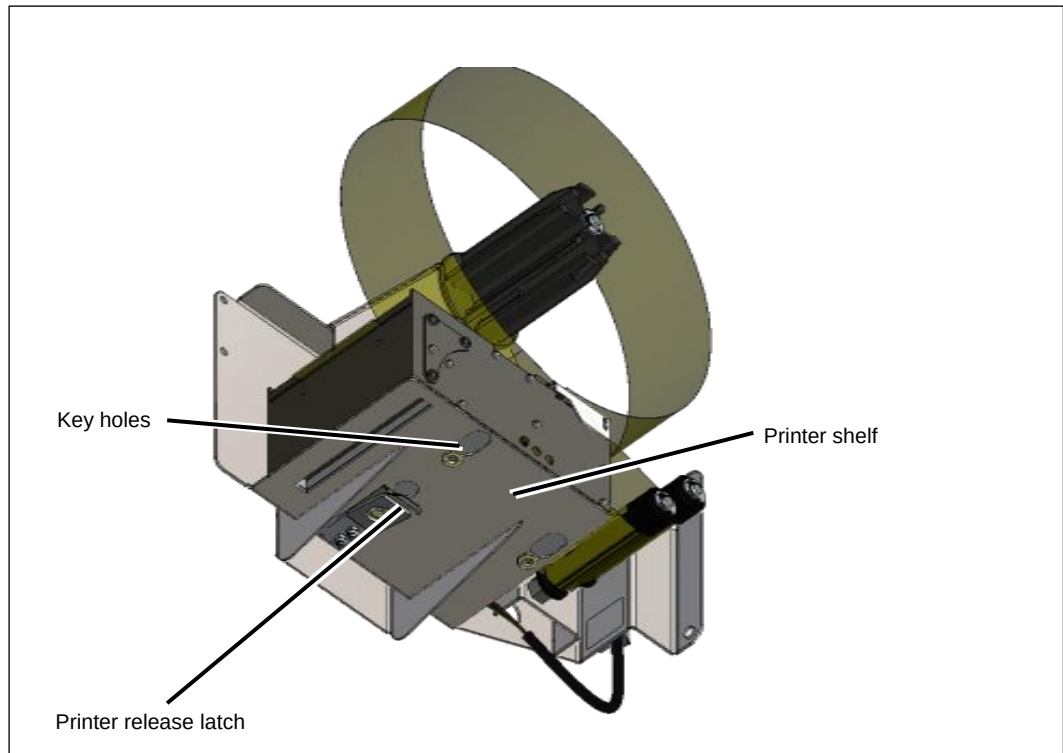


Figure 33. Removing the printer

To remove the printer, keep the locking latch down while you pull the printer out as far as possible to the right (about 10 mm), then lift the printer away.

4.4.2

Paper supply

The paper roll is supported by a hub designed for correct paper roll position with 58 mm rolls.

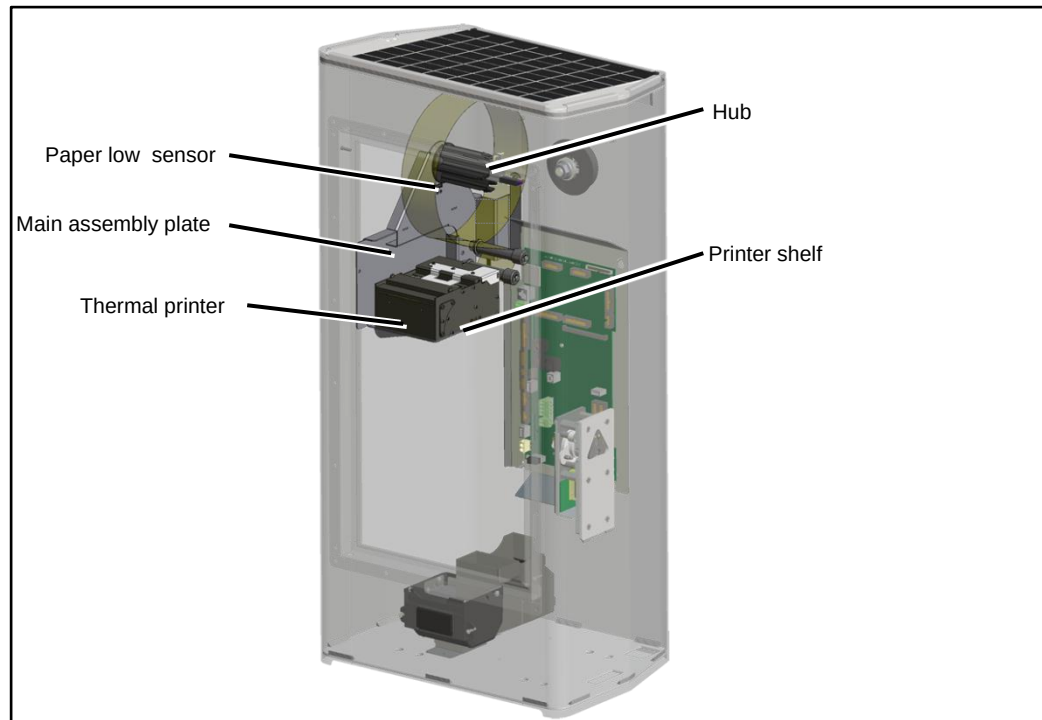


Figure 34. Printer module.

An optical paper low sensor is mounted at the main assembly plate behind the paper roll. The sensor changes its state when there are about 150—200 tickets left on the roll. Rather than using the optical near end sensor, it is possible to use an internal ticket counter and enter the amount of printed tickets after which an alarm or warning should be generated. An out-of-paper sensor is built into the thermal printer.

4.5

Mechanical locks

The standard lock in the CWT Compact is a mechanical Exec lock from Assa Abloy.

Also see *Door locks*.

4.6

Electronic locks

The electronic lock has a relay operated latch mechanism that prevents anyone from opening the key lock unless the person can prove his identity.

NOTE! — The minimum voltage required for proper operation of the electronic locks is 11.1 V at room temperature (20 °C).

The upper and lower E-lock modules are identical. There is, however a DIP-switch the setting of which decides whether the lock is used in the cabinet or the base. The E-locks are connected to the CPU board (Connector J16) board in series.

Also see *Door locks*.

4.7 Door sensors

The door sensors consists of a magnetically sensitive switch mounted inside the cabinet and base and a permanent magnet mounted on the cabinet/base doors.

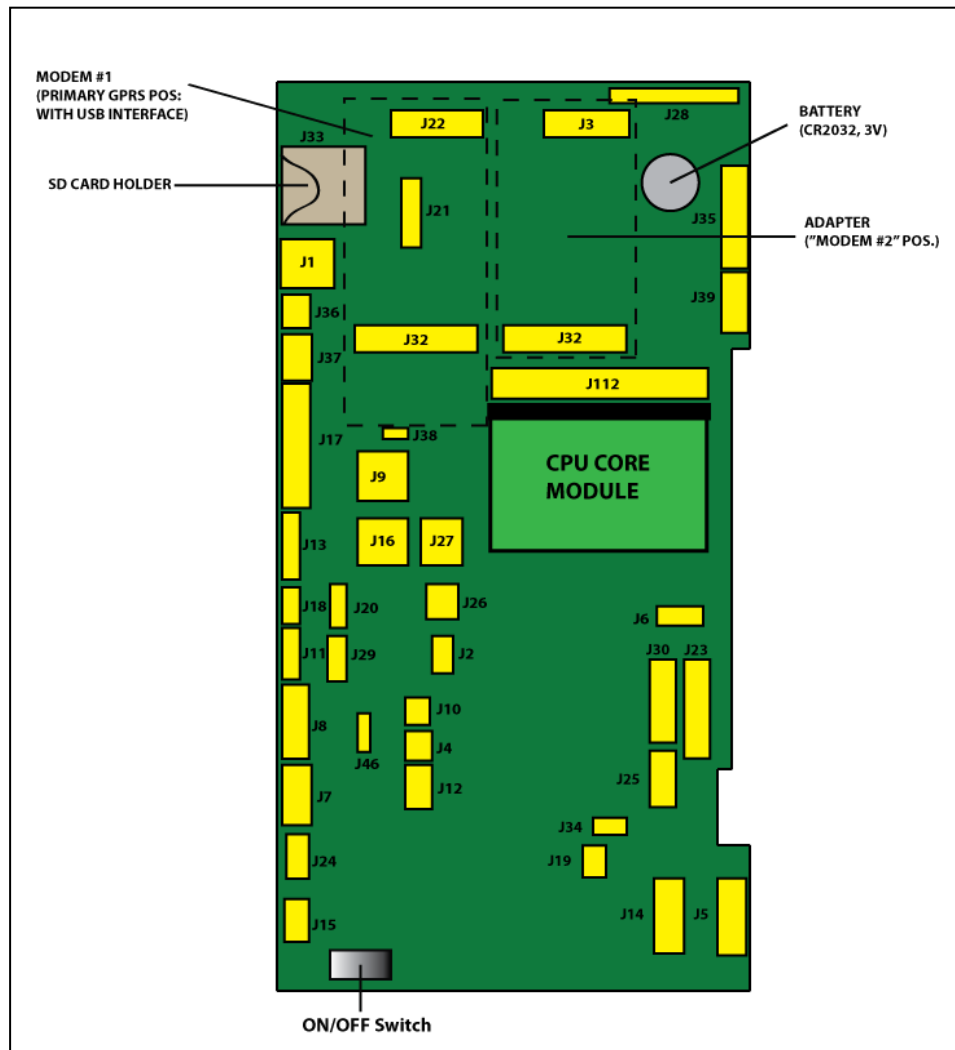
Also see *Door-open sensors*.

4.8 CWT Compact control system

4.8.1 CPU board

The CPU board consists of a main printed circuit board assembly and a sub board (type SO-DIMM) which, in this manual, is called the *CPU Core Module*. It contains a 32-bit 200 MHz processor with a 64 MB non-volatile flash memory used to store the operating system (Windows CE) and a 128 MB RAM. The latter, including the real-time clock, is backed up by a battery positioned on the CPU board.

The figure below shows the positions of connectors etc. The figure is followed by a list of all connectors and their use.



Connector	Function
J1	104 bus, RS-485
J2	(Reserved)
J3	Modem #2 position. Cannot be used for modem due to restricted space. Can be used for an adapter in the future.
J4	Opto coupled input (vibration detector for instance, alternative position)
J5	Battery (12 V) in pedestal
J6	USB#1
J7	Escrow
J8	Coin verifier. Alternative connection. Also see J46.
J9	CWT bus, Used for piezo buttons and keyboard
J10	Opto coupled input (vibration detector for instance, alternative position)
J11	Antipin module
J12	Relay output (vibration detector for instance)
J13	Button board
J14	Printer 12 V (in from battery)
J15	Printer 24 V (to printer)
J16	CWT bus, Used for electronic locks.
J17	I/O board
J18	Coin box and lower door switches
J19	12 V out (to value card reader for instance)
J20	Upper door switches
J21	(Reserved)
J22	Modem#1
J23	CPU JTAG (for loading of Windows CE OS by means of a JLINK device)
J24	USB#1
J25	AVR JTAG (for loading of AVR software)
J26	USB, type B
J27	Ethernet
J28	Display
J29	USB, type A
J30	(Reserved)
J31	Modem#2 (cannot be used for modem due to restricted space. Can be used for an adapter in the future)
J32	Modem#1

<i>Connector</i>	<i>Function</i>
J33	SD card receptacle
J34	External light
J35	(Reserved)
J36	Solar panel
J37	MDB interface (MDB = Multi Drop Bus)
J38	(Reserved)
J39	Key pad
J46	Coin verifier with MDB interface. Also see J8.
J112	CPU core module

4.9 The CWT Compact display PCB assembly

4.9.1 Display component

The CWT Compact has a monochrome graphical 148×73 mm STN TFT display with 260×128 pixel resolution. There are four fixed software-controlled Piezo buttons below the terminal display. The function of each button is described in the terminal display and is fully customisable and programmable. The **ACCEPT** and **CANCEL** buttons are located on each side of the 4 software-controlled buttons and contain symbols that also are shown in the display to provide a user friendly interface. The function of the buttons changes dynamically depending on the current phase of a purchase or information retrieval. The current function of a key is indicated by an adjacent caption or instructive text in the display.

The CWT Compact terminal also has an optional full alphanumeric Piezo keyboard that can be used to enter the vehicle registration number, zone number, space number or any other identifier to a purchase.

4.9.2 Warning/error indicator

The warning/error indicator and the ambient light sensor are mounted on the display printed circuit board.

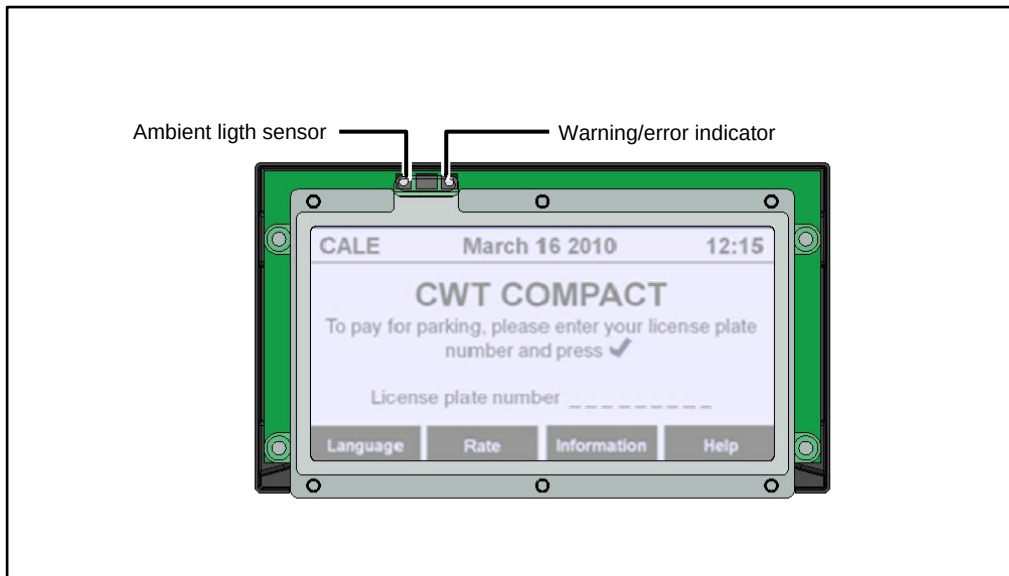


Figure 35. Position of warning/error indicator and ambient light sensor.

The warning/error indicator can light with either red or yellow color.

RED = Error
YELLOW = Warning

4.10 Heating system

CWT Compact can be provided with heating in both the cabinet and the base by means of 100 W heating fans and thermostats adjustable between 0 and 60 °C.

Both the fan and the thermostat are mounted on existing DIN rails. The heating fan is connected to one of the two 230 V (115 V UK) outlets (for the heating radiator) and one 12 V outlet (for the fan itself) in the battery charger module located in the base.

4.11 Power supply

CWT Compact terminals are powered by a gel type, maintenance free lead-acid battery. The battery is charged from the mains power grid or from the solar cell panel (if installed). Alternatively, the terminal can be operated without any battery charging which means that the battery has to be replaced regularly.

⚠ DANGER! — Always ensure that the external power supply to the ticket terminal is disconnected or switched OFF before carrying out any work on parts that ordinarily conduct dangerous current.

4.11.1 Power control

The battery voltage can be measured automatically on a regular basis and a report can be sent to CWO periodically. See the *CWT Software Configuration Handbook*.

A *warning event* can be generated and sent to CWO if the voltage drops below a certain warning level. The default value is 11.9 V.

The terminal will be set in *error state* and an error event can be sent to CWO if the voltage drops below a certain error level. The default value is 11.5 V.

A *restore event* will be generated and can be sent to CWO when the voltage, while increasing, reaches a certain recovery level. The default value is 12.1 V. A typical measured value is 12.5 V.

NOTE! — The automatically measured voltage usually differs from the battery voltage measured with a voltage meter without any load applied.

When the battery is being charged, the measured charging voltage will be approximately 13.7 V.

Under certain circumstances, a sleep mode function can be activated if the terminal is solar powered, or powered by the battery only.



IMPORTANT! — The minimum voltage required for proper ticket printing and operation of the electronic locks is 11.1 V at room temperature (20 °C).

4.11.2 Battery charging by mains power

In mains powered terminals the 12 V battery is charged by the battery loader that outputs 12 V (13.8 V) to the battery via a separate 6.3 A fuse.

The charger has three indicators:

GREEN	ON when 230 V (115 V UK) Mains power is available.
YELLOW	ON when charging is in progress.
RED	Initially ON when a deeply discharged battery is being charged.

The charger also has a 12 V distribution panel with three output connectors and two 230 V (115 V UK) outputs for optional heating fans.

A diode in the battery charger protects the circuitry if the battery is connected with wrong polarity. In such a case one or both of the main fuses F1 and F2 on the CPU board may blow.

The cable from the mains power grid is connected to a termination block in the terminal's bottom compartment. The termination block contains a residual-current device, optionally combined with a fuse.

4.11.3 Battery charging by solar power

A solar powered terminal has no battery charger. Instead, the solar panel charges the battery via the CPU board and a cable between the CPU board and the battery. The CPU board measures the charging current and if the charging voltage exceeds 18 V a fuse will blow.

The result of the measured charging current is sent to CWO. A warning event will be generated if the current drops below the warning level and the terminal will be set in error state if the current drops below the error level. A restore event will be generated when the current reaches the recovery level. See *CWT Software Configuration Handbook* for more information about this.



Figure 36 – CWT Compact solar panel example

4.12

CWT Compact interconnections

This document is our property and shall not without our permission be altered, copied, used for manufacturing or communicated to any other person or company.

© Gale Access AB, Sweden

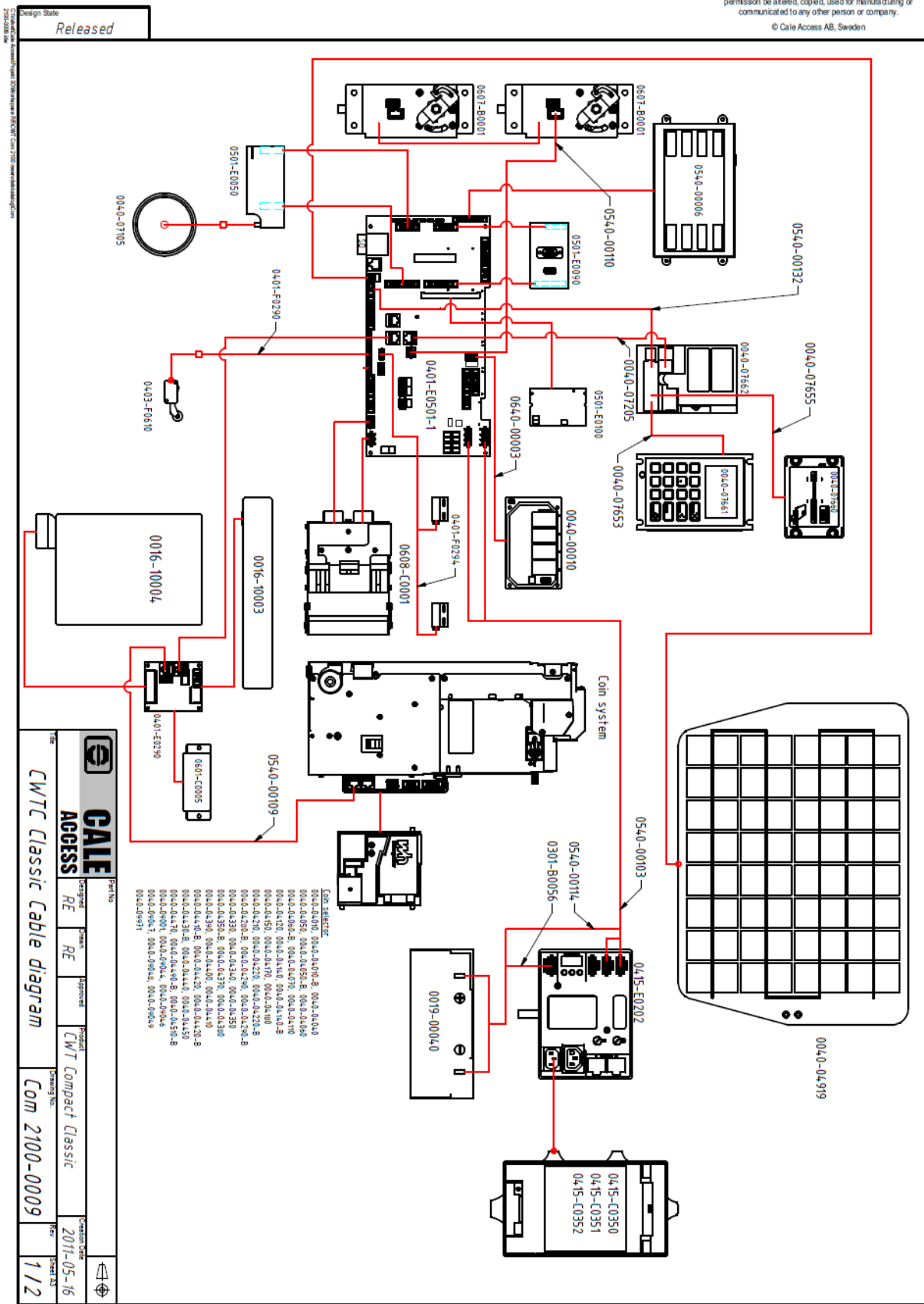


Figure 37. CWT Compact interconnections

1	1	0301-B0056	Battery cable, short	
2	1	0040-07089	Magtek hybrid reader cable	
3	1	0401-E1029	Printer cable 104	
4	1	0401-E1068	Keypad adapter cable	
5	1	0401-F0250	Cable MP104 printer-CPU	
6	1	0401-F0261	Cable MP104 emp 800 master board	
7	1	0401-F0270	Cable MP104 antipin-CPU	
8	1	0401-F0280	Cable MP104 slot reader - master	
9	1	0401-F0290	Cable MP104 CPU to coin-box	
10	1	0401-F0700	CWT104 USB printer cable	
11	1	0401-F0701	CWT104 24V printer cable	
12	1	0401-F0702	CWT Compact display cable	
13	1	0401-F0564	Display cable MPC	
14	1	0540-00103	CWT104 12V battery cable	
15	1	0540-00114	CWT/CWT104 12V solar cable	
16	1	0501-E0090	CWT USB + RS232 adapter	
Item	Qty	Part No.	Description	Note

Figure 38. CWT Compact Cable diagram

5 INSTALLATION

5.1 Site preparations

5.1.1 Space requirements

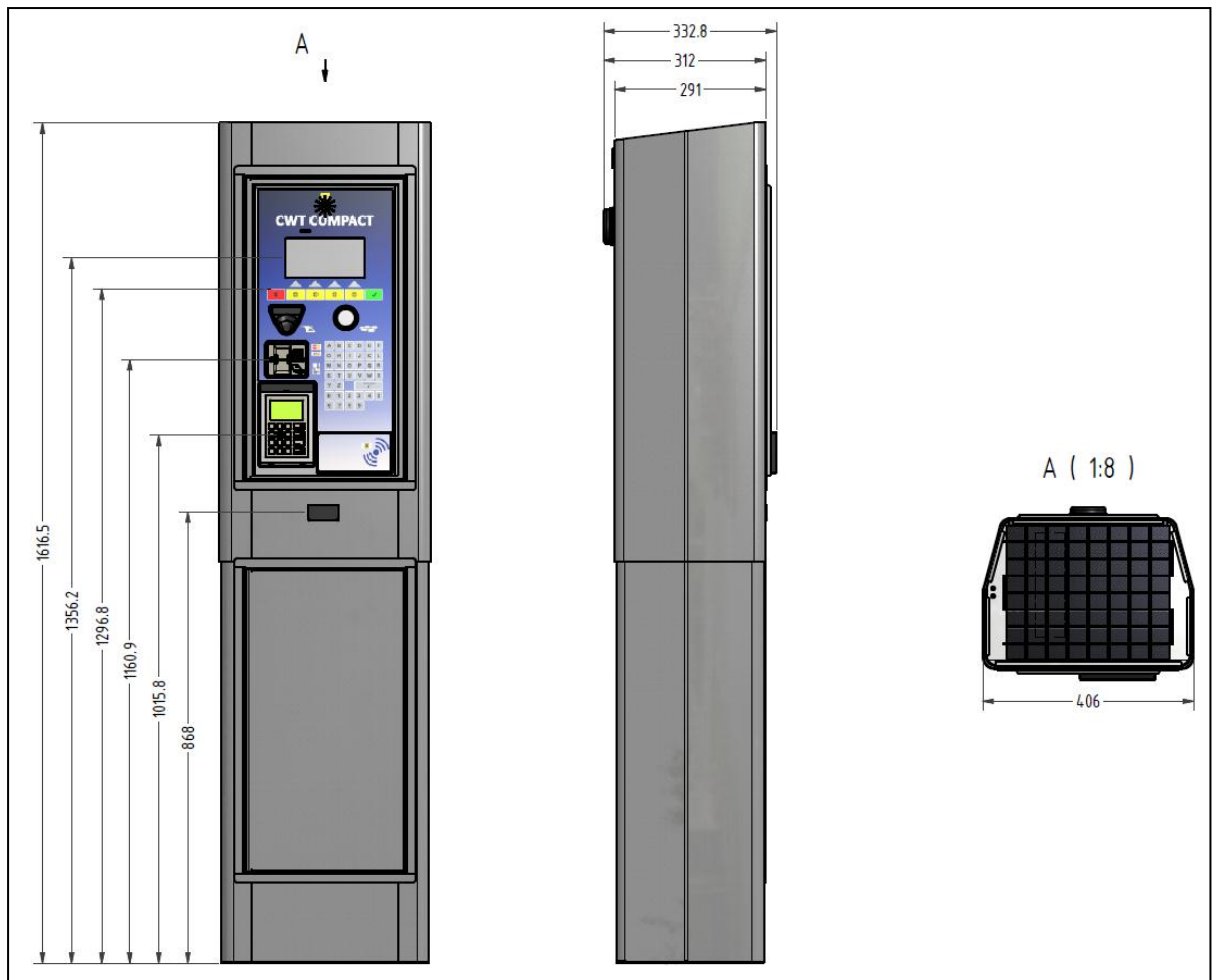


Figure 39. Terminal measurements.

Note! CWT Compact is available in two heights, the one presented in the figure above (1616, 5 mm) and a shorter one (1516,5 mm).

5.1.2 Power supply



DANGER! – Only qualified personnel may carry out electrical installation. Follow all local regulations.

Unless otherwise agreed, the customer is responsible for providing an appropriate 12V battery. For CWT Compact terminals connected to the grid power supply, a battery capacity of 17 Ah is required. Terminals equipped with a solar cell panel require at least 45 Ah.

The customer is responsible for installing cables for terminals that will use the grid power supply. When delivered, terminals are ready to be connected to the power supply used at the installation site. It is up to the customer to ensure that the correct type of battery charger and fuses are used. **Note!** The maximum total power consumption depends on the configuration of the terminal.

5.1.3

Placing the terminal on an existing concrete foundation

The pedestal is attached directly to the foundation using 4–8 expansion bolts, see *figure 47*. Maximum bolt diameter is 12 mm.

The bottom plate extends 1.5 mm below the housing of the pedestal and you can place the pedestal directly on top of the foundation without any risk of damaging the housing.

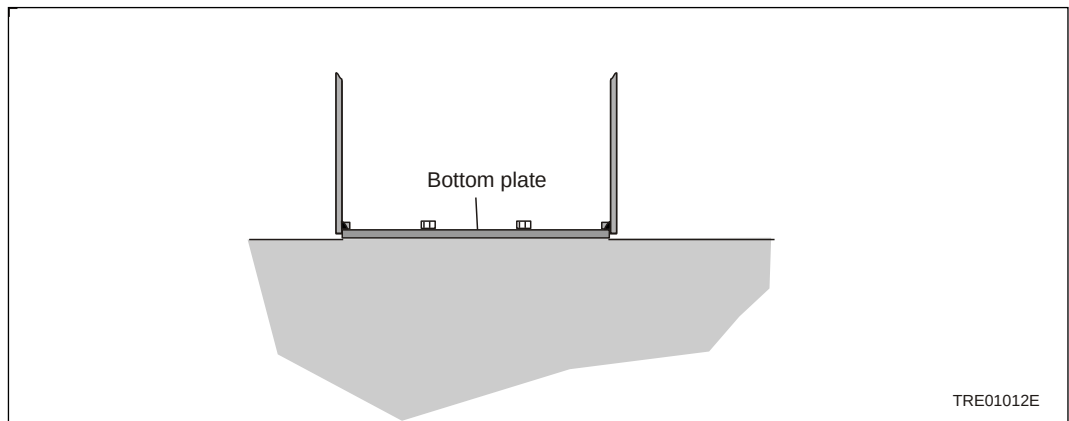


Figure 40- Terminal placed directly on the foundation



IMPORTANT! — Terminals for coin payment must be properly aligned vertically because the function of the antipin module and the coin verifier may be interrupted if the terminal leans more than a couple of degrees in any direction.

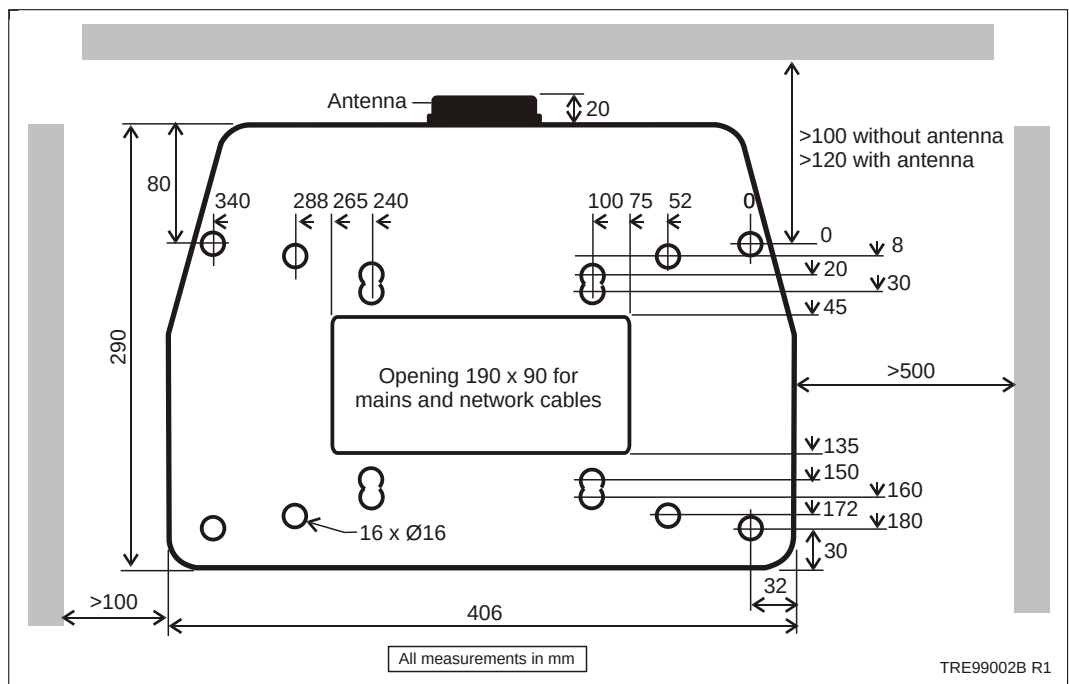


Figure 41. Terminal installation drawing

The above figure shows all the alternative mounting holes in the pedestal's bottom plate. See *Pouring a new concrete foundation* regarding placing the terminal on a base anchor cast into a foundation.

Cable for connection to the power grid is drawn through the floor (from the floor below, for example) and into the pedestal through the opening in the mounting frame (optional). Alternatively, a hole can be drilled in the pedestal and the cables drawn in some other way. The cable must be protected against damage. Use proper cable bushing to prevent cable wear and moisture entry into the pedestal.

The given distances between fixed objects at the back and the sides of the terminal are minimum recommended distances:

- The distance behind the terminal enables easy handling while mounting the terminal and also some vertical adjustment of the terminal.
- The distance at the left side ensures that the doors can be fully opened.
- The distance at the right side allows easy insertion of the door key and also gives enough space if a locking mechanism needs to be repaired.



DANGER! – Follow local regulations regarding electrical installations.

5.1.4

Pouring a new concrete foundation

If the installation site does not have an existing concrete base or the equivalent, you can pour a concrete foundation, casting a base anchor (0403-B0122) into position. The base anchor is supplied as a flat package containing parts to be assembled at the installation site.



Figure 42. Base anchor 0403-B0122.

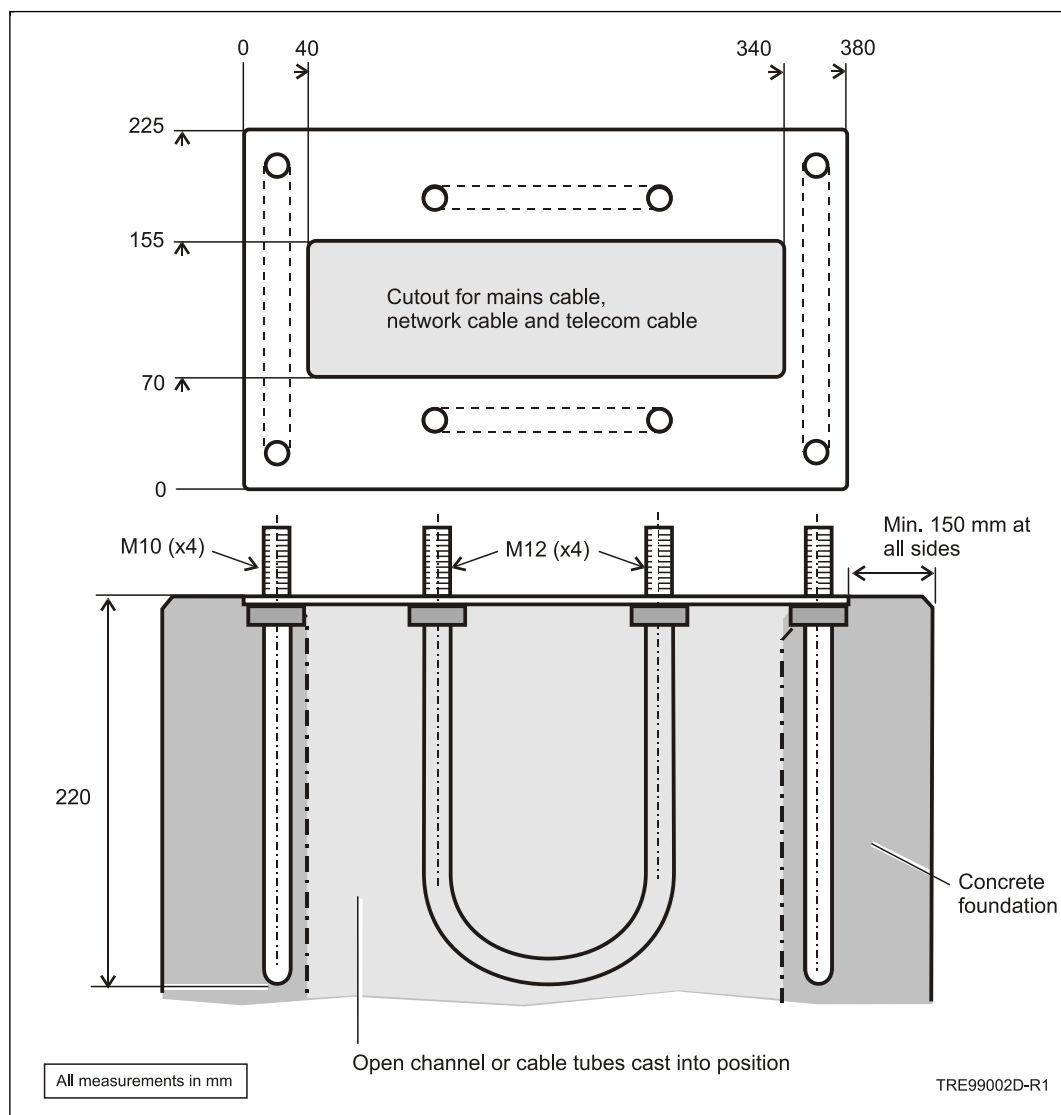


Figure 43. Base anchor measurements.

If the terminal should be connected to the grid power supply, a duct must be cast in the concrete foundation so that the cable can be routed in through the bottom of the base. You can cast an approved type of plastic or steel pipe, according to local regulations.

⚠ DANGER! – Follow local regulations regarding electrical installations.

5.2 Installing the terminal

Due to its heavy weight the terminal is usually transported in two pieces to the installation site where the base is secured to a concrete base or floor before the cabinet is mounted on top of the base.

Provided there is an appropriate lifting device or a hand cart at hand, the entire terminal can be installed as a complete unit.

5.2.1

Putting the base or complete terminal in place

⚠ WARNING! – Lifting the base, the cabinet, or the complete terminal, requires two or three persons due to the heavy weights.

⚠ WARNING! – Before the terminal has been secured to the foundation, there is a risk of the terminal tipping forward, especially when you open the cabinet door.

1. Place the terminal at the site that has been prepared.
2. Fasten the terminal with 4–8 expansion screws or mount the terminal on an existing base anchor or similar using the appropriate nuts and washers.



IMPORTANT! — The function of the coin system and the water drainage (door shelf) may be interrupted if the terminal leans more than a couple of degrees in any direction.

5.2.2

Mounting the cabinet on top of the base

1. Remove the 4 screws fixing the protective plate at the top of the base. The screws will be used to secure the cabinet onto the base.
2. Carefully place the cabinet on top of the base.
3. Secure the cabinet to the base with the four screws as mentioned above.
4. Thread the unconnected cables up into the cabinet or down into the base.

5.2.3

Installing the battery in a mains powered terminal

1. Place the battery on the floor in the lower compartment.
2. Connect the battery to the 12 V distribution panel on the battery charger, to the connector marked *BATTERY*.



IMPORTANT! — The RED colored lead must be attached to the PLUS pole on the battery. Connecting with wrong polarity will blow one or more fuses on the CPU board.

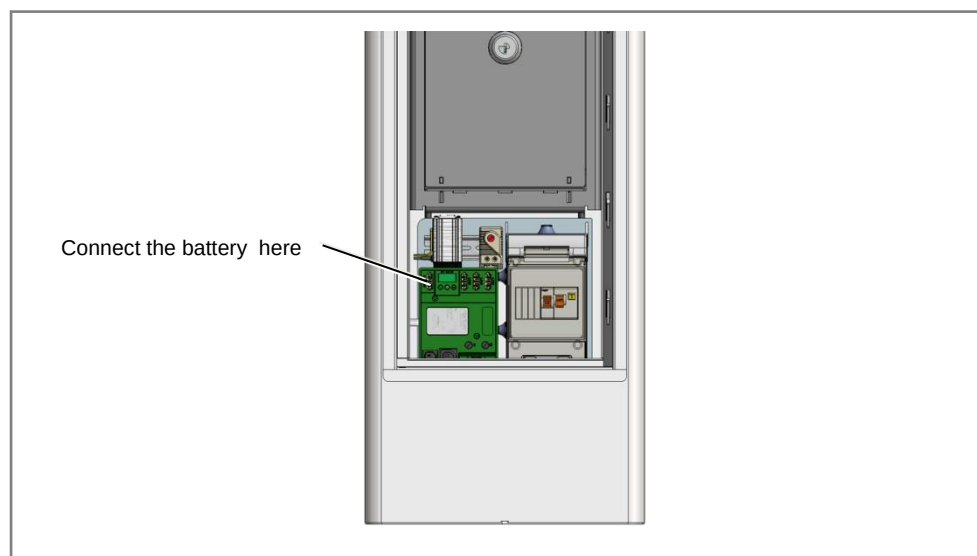


Figure 44. Connection of battery to 12V distribution panel

5.2.4 Installing the battery in a solar or battery-only powered terminal

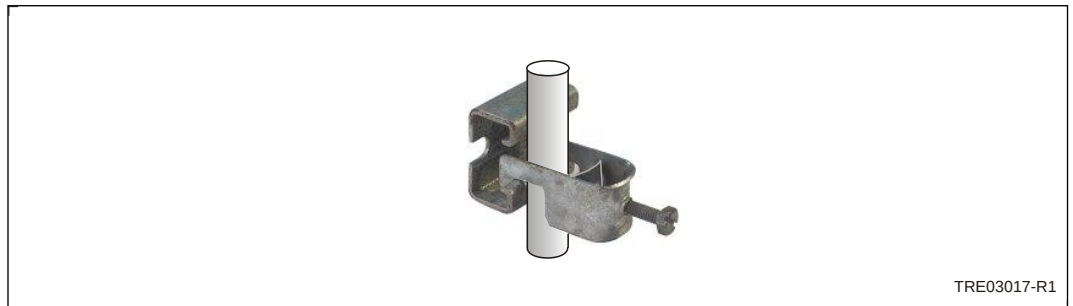
1. Place the battery on the floor in the lower compartment.
2. Connect the 12 V supply cable from connectors J5 and J14 on the CPU board to the battery.



IMPORTANT! — The RED coloured leads must be attached to the PLUS pole on the battery. Connecting with wrong polarity will blow one or more fuses on the CPU board.

5.2.5 Connecting to the mains power grid

1. Connect the incoming power cable to the terminal block (automatic residual current device or fuse socket) in the pedestal (design may vary due to customer requirements). See *Installing the battery in a mains powered terminal*.
2. Secure the cable using the strain relieving clamp. See Figure below.



TRE03017-R1

Figure 45. Power cable strain relieving clamp

5.2.6 Installing a modem

The end customer is entirely responsible for the set up and function of the modem communication unless otherwise is agreed upon in writing with the Cale representative. The installation procedures of them both are described below.

PARTS REQUIRED

- Cale modem 0501-E0050
 - SIM-card with subscription to data communication service.
 - Cale antenna 0040-07105 GSM/GPRS antenna.
 - Self-adhesive label with subscription telephone number / SIM card number.
 - Self-adhesive Cable camps.
1. Open the SIM card holder and insert the SIM card with the card's cut-off corner positioned as shown in Figure below.

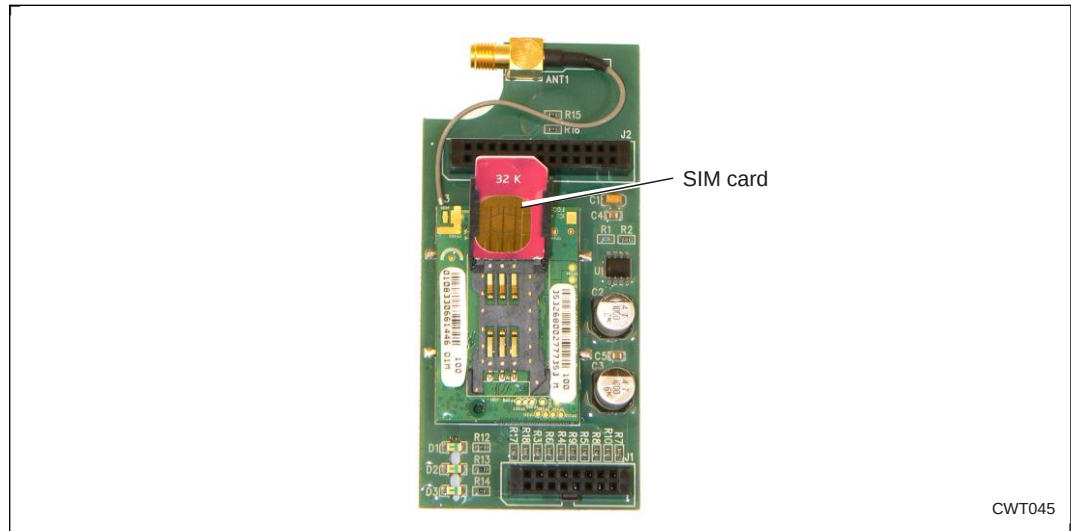


Figure 46. Open the SIM card holder and insert the SIM card as shown

2. Close the SIM card holder and mount the modem in the modem position on the CPU board. Modem position #1 should be used. See *CPU board*.
3. Write the subscription telephone number / SIM card number on the label and attach the label, fully legible, inside the cabinet, not on the modem itself because it might be necessary to replace the modem some time.

INSTALLING THE ANTENNA

External (Cale antenna 0040-07105):

1. In the back of the CWT there is a prepared hole. The hole is positioned according to the figure below:



Figure 47. CWT Compact back

2. Put the antenna in the hole and fasten it with a bolt.
3. Connect the cables to the modem.



Figure 48. CWT Compact back with antenna

CHECKING MODEM CONTACT WITH NETWORK PROVIDER

1. Switch ON the terminal.
2. Check the modem's status indicators.

RED	Registered in the GSM network. Should always be ON.
YELLOW	Connected to the GPRS network. Should always be ON.
GREEN	Connected to GPRS network and ready to communicate with, or communicating with the CWO gateway.

5.2.7 Loading paper

LOADING TICKETS FROM ROLL

1. Remove about 0.7 m of the paper from a new roll to ensure there is no glue residue left.
2. Orient the roll so the paper leaves the roll from the bottom and rearwards. The temperature-sensitive layer should face toward the back of the terminal.
3. Check that the cables leaving the back of the printer run under the paper guide toward the left side of the cabinet. This is important because they might otherwise disturb the paper feed.
4. Put the roll onto the roll hub.
5. Lift the print head.
6. Feed the paper round the lower guide-rolls and in to the printer.
7. Keep the *Feed* button pressed while you lower and lock the print head in its operating position again.
8. Release the *Feed* button.
9. The paper will move back and forth a few times as black mark calibration is performed. The yellow status indicator lights steadily when the calibration, and thus the loading procedure, is completed.

5.2.8

Installing the coin box

1. Open the vault door with the appropriate key.
2. Insert the coin box.
3. Turn the opening knob a quarter turn counter clockwise into vertical position. This will lock the box into position in the base and open the collection hatch on top of the box.



IMPORTANT! — If the knob is now returned to the horizontal position, the box must be emptied before the knob can be returned to the correct position. The vault door cannot be closed while the knob is in the horizontal position.

4. Close the vault door and lock it.

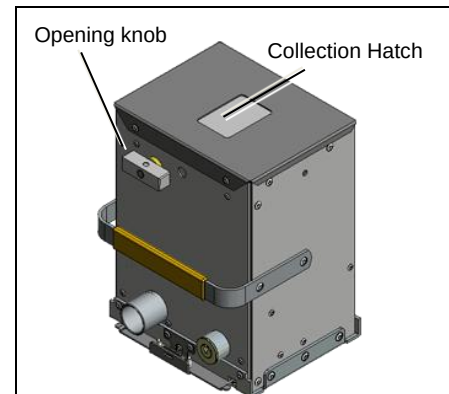


Figure 49. Coin box

5.3

Program loading

Usually, a CWT Compact terminal comes complete with the appropriate application software and settings.

The **CWT application software itself** is subject to continuous improvements which mean that CWT terminals will benefit from being updated now and then.

At some times it may also be necessary to update **AVR firmwares**, see more in *CWT Software Configuration Handbook*.

Finally, it might be that the terminal's **operating system (Windows CE)** needs to be updated.

5.4

Changing the terminal's settings

Sometimes, a terminal's **application software settings** need to be adapted to meet new functional requirements. There are some alternative ways to change software parameters, etc. See the *CWT Software Configuration Handbook*.

6

OPERATION

6.1

Changing and emptying the coin box



Figure 50. Coin box

6.1.1

Removing the coin box

See Figure 50.

1. Open the vault door with the appropriate key.
2. Turn the opening knob clockwise to the horizontal position. This closes the collection hatch and releases a catch that holds the box in position in the vault.
3. Pull the coin box out. A collection ticket will be printed.

6.1.2

Emptying the coin box

See Figure 50.

1. Turn the collection lock clockwise with the appropriate key. The same key combination is usually used for all coin boxes.
2. Pull the emptying hatch out completely. This will empty the box of its contents and activate the internal mechanism.
3. Push the emptying hatch in. **The hatch can be pushed back in only if it has previously been pulled completely out.**
4. Turn the collection lock counter clockwise and remove the key.

6.1.3

Inserting the coin box

See Figure 50.

1. Insert an empty coin box.
2. Turn the opening knob counter clockwise to its vertical position. This locks the box into position in the vault and opens the collection hatch.



IMPORTANT! If the knob is accidentally turned to the horizontal position at this point, the box must be emptied as described in Section 6.1.2 before the knob can be returned to the correct position.

3. Close the vault door. The opening knob must be in the vertical position for the door to be closed.

6.2 Paper refill

1. Raise the print head and remove the remaining paper, if any.
2. Install new paper roll as described in section *Loading paper*.
3. Check that the document exit shutter is lowered as shown in *Figure 28*.

This chapter is primarily concerned with **which** preventive maintenance activities to carry out. **How often** these activities need to be carried out depends, to a large extent, on the conditions of the area where the ticket terminals have been installed. The thermal head, for instance, must be cleaned more frequently if the surrounding air contains a high concentration of diesel exhaust fumes.

7.1 Batteries

7.1.1 Lead accumulators

Follow normal procedures for the handling of lead accumulators. Instructions are usually available from the battery supplier.

Follow local regulations for the disposal of replaced batteries. Used batteries should be returned for recycling if required according to local laws and regulations.

7.1.2 Battery on CPU board

The CPU board contains a lithium battery (button cell) that should be returned for recycling if required according to local laws and regulations. The battery (CR2032, 3 V, 210 mAh, 20 mm diameter) supplies backup voltage to the real-time clock in case of interrupted power supply from the 12 V batteries.



IMPORTANT! — To ensure uninterrupted terminal operation, replace the battery every 5 years.



WARNING! – Lithium batteries can be dangerous because they can explode if short-circuited. Handle batteries in accordance with local laws and regulations.

7.2 Printer

7.2.1 Cleaning

Visible paper dust should be blown off regularly (at least once per year), especially from the black mark and paper-out opto-sensors.



CAUTION ! – Deposits accumulating on the row of heating points on the print head will negatively affect the thermal head's cooling which might damage or destroy the print head.

The print head must be cleaned regularly. The frequency of cleaning depends on factors such as paper quality, the type of pre-printing on the tickets, and the degree of air pollution.

1. Remove the presenter rolls assembly (see *Front pressure rollers replacement*).
2. Remove the presenter table (see *Presenter table replacement*).
3. Remove the cutting blade (see *Cutting blade replacement*). Take care because the blade may be greasy!

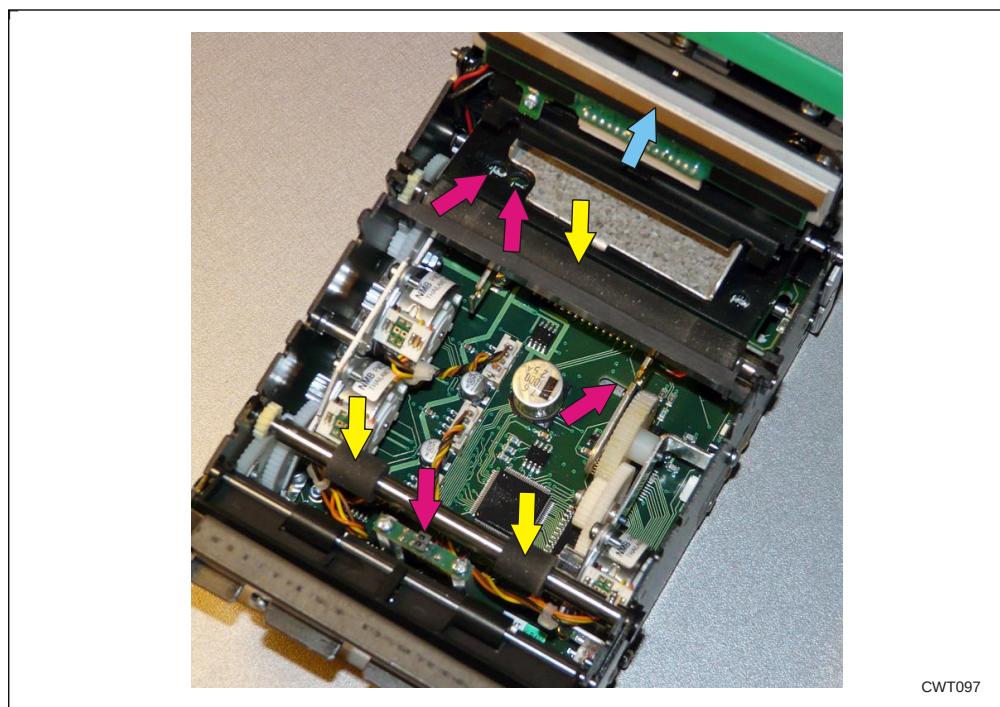


Figure 51. Cleaning points inside the printer.

4. Use an air blower to get rid of dirt and small paper particles inside the printer.
5. Check that the presenter sensor, the black mark/paper out sensor, and the cutter home sensor is clean (marked with red arrows in *Figure 51*).
6. Moisten a lint free piece of cloth (non-woven textile is recommended) or a piece of paper with platen cleaner solvent usually available on the market.
7. Wipe off the presenter feed rolls and the platen (see yellow arrows in *Figure 51*) while rotating them. Ensure that there are no paper particles left.
8. Wipe off the row of heating points (blue arrow in *Figure 51*) on the print head using isopropyl alcohol.
10. Assemble removed parts as described in sections 8.2.4, 8.2.6 and 8.2.7.
11. Check that the document exit shutter is in the correct position before reinstalling the printer.

7.2.2

Testing

1. With paper loaded, press the *Feed* button just after closing the print head. This produces a self test printout.
2. The printer exits self test mode and goes on-line.

7.3 Coin handling unit

7.3.1 Cleaning

Get into the habit of regularly checking (once or twice per year) for foreign matter in the various parts of the coin unit.



IMPORTANT! — Use isopropyl alcohol for cleaning. If another solvent is required, test it first to make sure it does not cause any damage.

7.3.2 Testing

The function of the coin unit should be checked regularly, for instance when refilling the ticket paper. Select *Utilities / Test purchase mode* in the service menu and make test purchases with all the applicable coin types.

7.4 Chip-card reader

7.4.1 Cleaning

Chip card readers do not require regular cleaning.

7.4.2 Testing

Test the function of the card reader regularly by making test purchases with a Cale test card.

7.5 Hybrid card reader

7.5.1 Cleaning

The magstripe read head in this device needs regular cleaning using commercially available cleaning cards for magstripe card readers.

7.5.2 Testing

Test the function of the card reader regularly by making test purchases with a Cale test card.

7.6 Display module, cleaning

This section is about cleaning of the outmost surface of the display modules. Cleaning the polycarbonate plastic display window in the cabinet door is described in section *Cabinet door display window, cleaning*.

 **CAUTION!** — Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Don't touch, push or rub the exposed polarizer covering the display surface of the LCD module with anything harder than an HB pencil lead. The polarizer is soft and easily scratched. Handle it carefully. Don't put or attach anything on the display area to avoid marks.

If the display surface is contaminated or dusty, gently wipe it with a soft dry cloth. To avoid damaging the surface do not scrub hard. If still not completely clear, moisten a cloth with **isopropyl alcohol** or **ethyl alcohol**.

Solvents other than those mentioned above may damage the polarizer. Especially, **do not use water, ketones such as acetone, or aromatic solvents**.

Immediately wipe off any drops of adhesives like saliva and water from the display surface. They might otherwise cause panel surface variations and color change.

7.7 Cabinet

7.7.1 Cleaning

Clean the exterior of the metal cabinet surfaces using petroleum spirits (white spirit) or a mild cleaning solution.

See Section *Cabinet door display window, cleaning*, regarding cleaning of the display window in the cabinet door.

See Section *Solar panel, cleaning*, regarding cleaning of the solar panel.

7.7.2 Lubrication

Lubricate the lock cylinders with *Kaba-Clean* spray or an equivalent lubricant. The autumn is a good time to do this.

Check the friction in the hinge pins of the doors. Lubricate if necessary with a lubricant such as Moebius 8200.

 **CAUTION!** – Thin lubricants such as CRC 556 must not be used.

7.8 Cabinet door display window, cleaning

Clean the outside using a very soft cloth such as the type used for cleaning glasses. Moisten with mild cleaning detergent solution. The rear side of the window is more sensitive than the outside and should be cleaned with great care.



IMPORTANT! — Do not forget to clean the glass in front of the warning/error indicator and the ambient light sensor. If the light sensor is obstructed, this can increase the terminal's power consumption.

7.9

Solar panel, cleaning

High efficiency of the solar panel requires that the panel is cleaned free from foreign objects such as dust, sand, leaves, excrements from birds, snow, ice, etc.

Regular checking of the solar panel is recommended.

When cleaning the panel, first remove dust and other loose particles by blowing or using a soft brush. If necessary clean the panel using a soft cloth moistened with a mild detergent solution

When removing snow or ice, do not use metal objects because they can scratch the panel surface which reduces the panel's efficiency. A plastic ice scrape is recommended.



CAUTION ! – The terminal must be switched OFF when you disconnect or connect cables inside the terminal. An exception is USB cables and USB devices that can be connected and disconnected without switching OFF the terminal.

8.1 Cabinet and base lacquer, touching up

Cale Access AB provides kits including touch-up paint (3 x 0.3 litres), sandpaper and instructions. When ordering, please state the article number and the color number (usually a RAL number) indicated on labels inside the cabinet and base.

8.2 Printer

To make it easier to conduct maintenance on the printer remove the printer from the terminal.

8.2.1 Print head, cleaning

If the print quality is poor, for example if there are longitudinal white lines in printed parts, clean as described in Section *Printer*.

8.2.2 Printer platen and feed rollers, cleaning

Usually, paper feed problems depend on the fact that paper dust and other dirt has gathered on the platen or the feed rollers. Clean as described in Section *Printer*.

8.2.3 Paper jam clearing

The area most prone to causing paper jam is the area around the platen and the cutting blade.

Removing the platen, and especially replacing it, requires that you remove the front presenter roller assembly and the presenter table as described in Sections *Front pressure rollers replacement* and *Presenter table replacement*.

8.2.4

Front pressure rollers replacement

REMOVAL

Be careful not to break the plastic tongue pressing at the centre of the shaft. Carefully release one end of the roller shaft at a time straight upward and remove the roller shaft assembly.

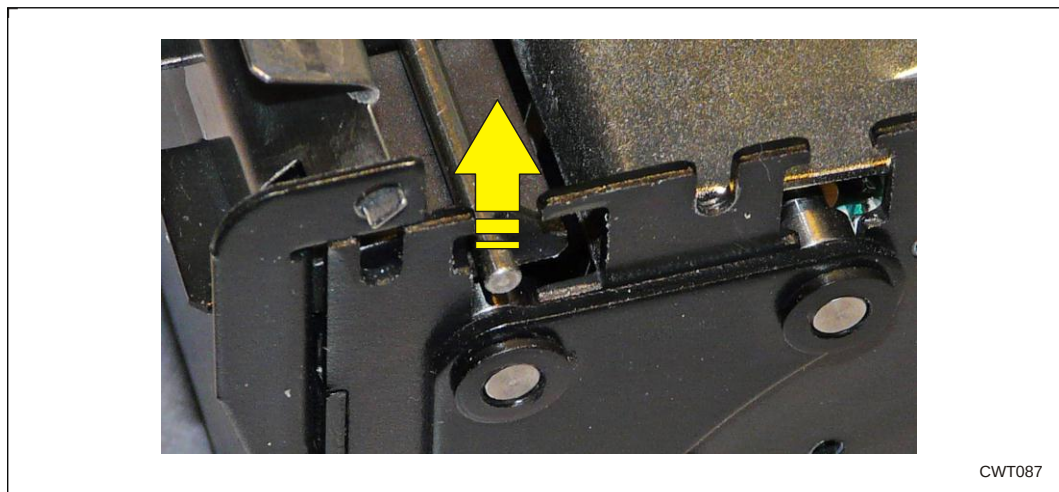


Figure 52. Front pressure rollers removal.

ASSEMBLY

Install in reverse order. Keep the assembly pressed down while tightening the screws.
DO NOT PRESS ON THE ROLLERS OR THE ROLLER SHAFT!

8.2.5 Rear pressure rollers replacement

REMOVAL

Loosen the four screws (Torx 8) indicated below and remove the roller assembly.

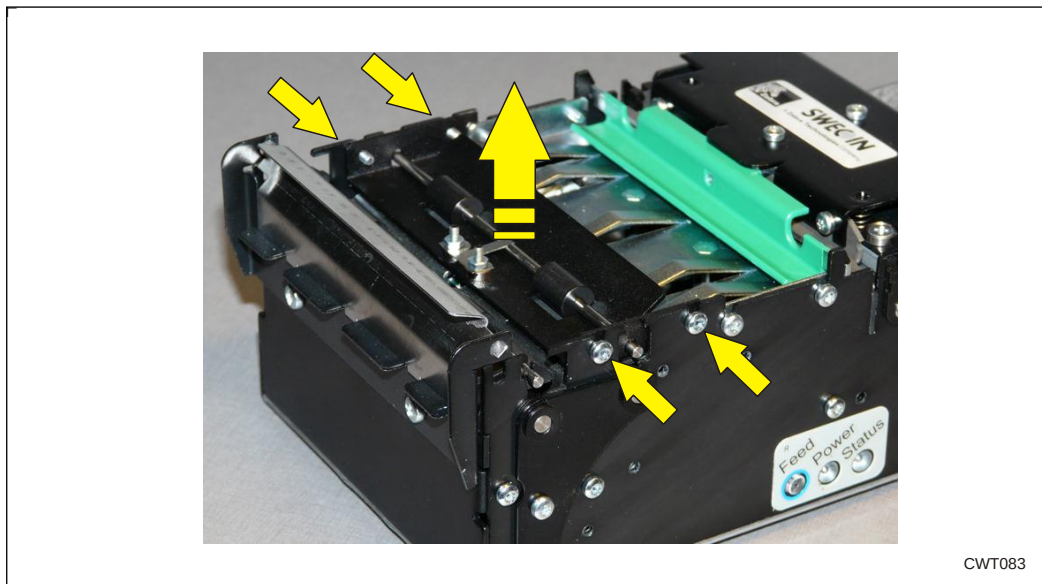


Figure 53. Removing the rear pressure rollers.

ASSEMBLY

Install in reverse order. Keep the assembly pressed down while tightening the screws.

DO NOT PRESS ON THE ROLLERS OR THE ROLLER SHAFT!

8.2.6

Presenter table replacement

REMOVAL

1. Remove the rear pressure rollers assembly (see *Rear pressure rollers replacement*).
2. Loosen the four indicated screws (Torx 8) and pull the table straight up.

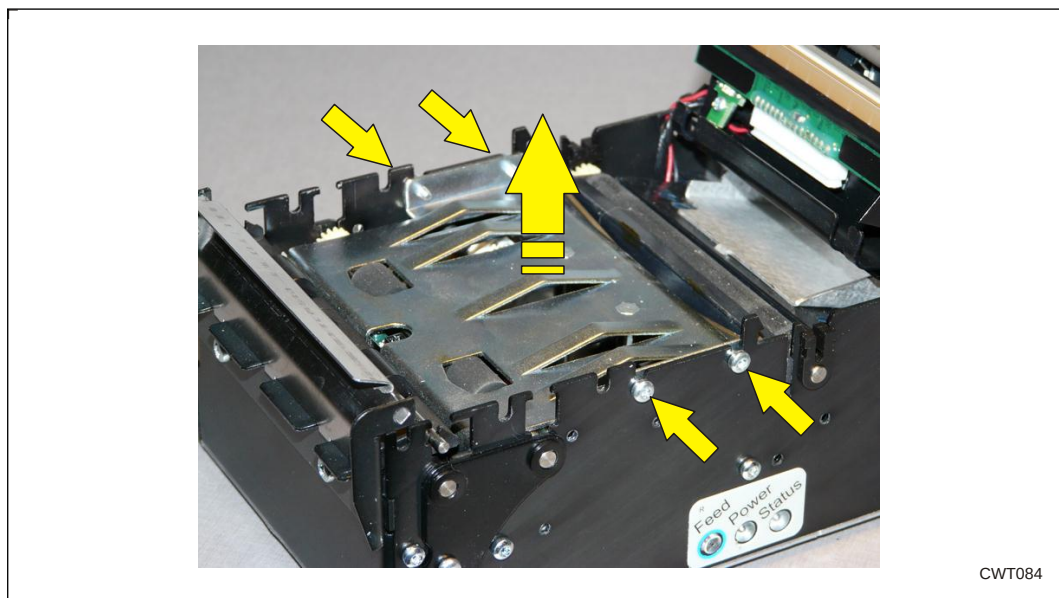


Figure 54. Removing the presenter table.

ASSEMBLY

Install in reverse order. Keep the assembly pressed down while tightening the screws.

8.2.7

Cutting blade replacement

REMOVAL

1. Remove the presenter rolls assembly (see *Front pressure rollers replacement*).
2. Remove the presenter table (see *Presenter table replacement*)
3. Rotate the cogwheel manually (see white arrow) until the cutter blade reaches its top position.

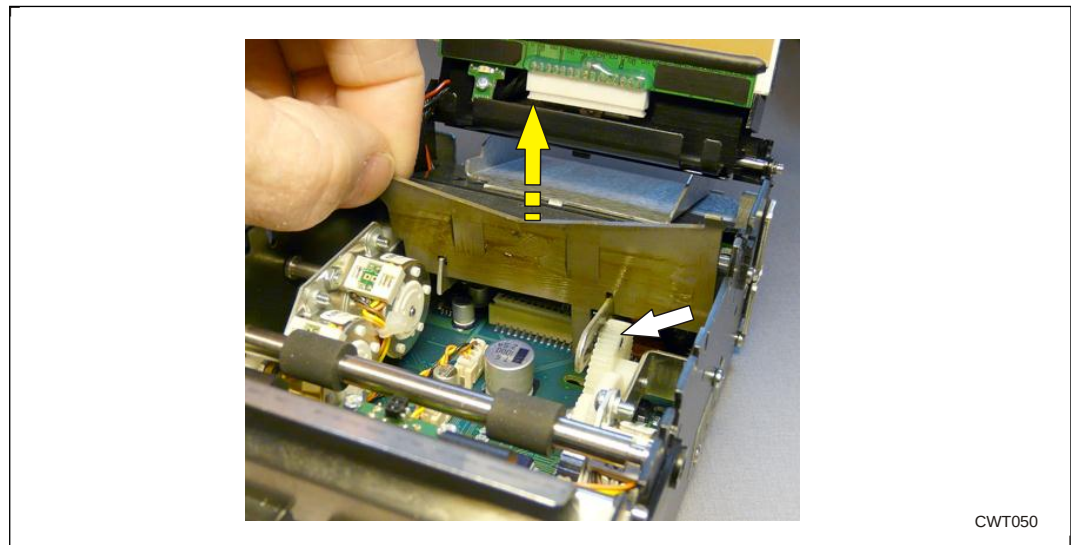


Figure 55. Removing the cutter blade.

4. Lean the blade slightly towards you and lift it out of the cutter linkage.

ASSEMBLY

1. Check that the cutter linkage remains in its upper position.
2. Fit the blade in the slots of the cutter linkage.
3. Gently push the blade rearward and turn the cogwheel to lower the blade to its bottom position. Make sure that the tab at the bottom of the blade enters the cut out in the integrated circuit board (see white arrows). This tab actuates an opto sensor fitted at the underside of the board.

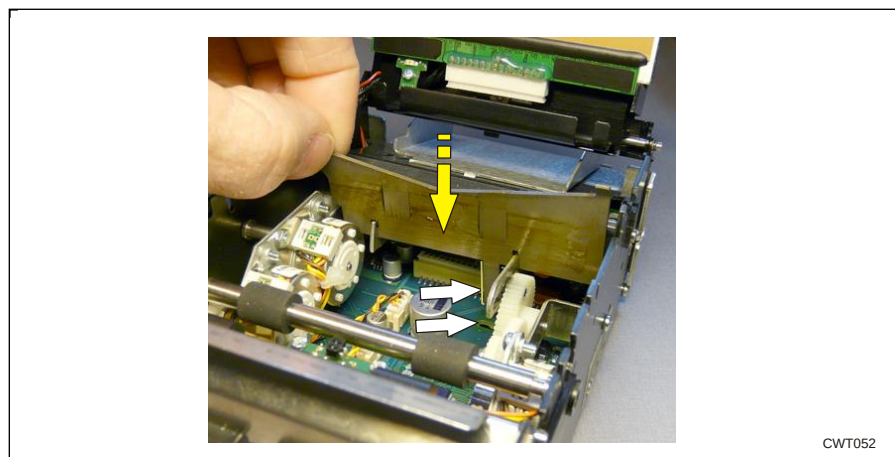


Figure 56. Installing the cutter blade.

8.2.8

Print head replacement

REMOVAL

1. Remove the two screws holding the print head. Take care of the collar-shaped hub under the right-hand screw.

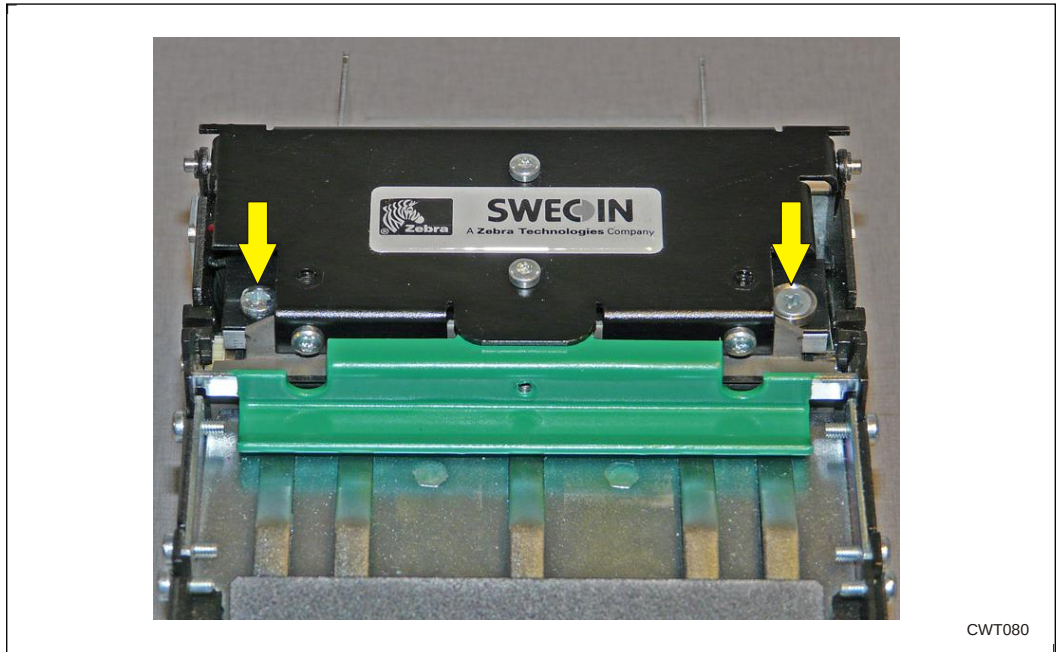


Figure 57. Loosening the print head.

2. Use a thin bladed flat screwdriver to pry the connector out from the socket. Remove the print head.

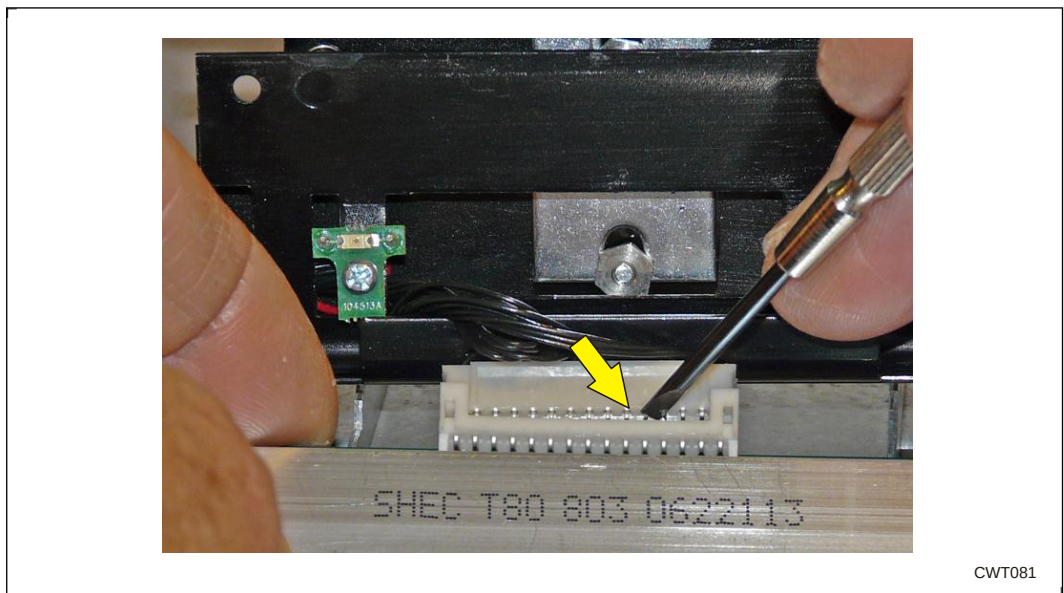


Figure 58. Disconnecting the print head cable.

⚠ CAUTION! — Never pull by the thin cable leads to loosen the connector because this will damage the leads.

ASSEMBLY

Install in reverse order. Keep the print head pressed down while you tighten the screws.

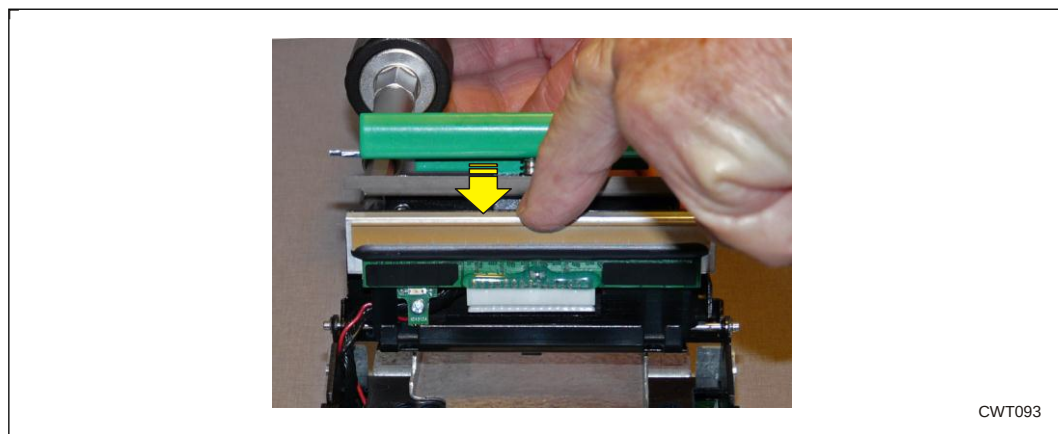


Figure 59. Keep print head down while tightening the screws.

8.2.9 Platen replacement

REMOVAL

1. Remove the presenter table (see *Presenter table replacement*)
2. Press one of the the fork-shaped plastic bearings together with your fingertips while lifting it up a little.

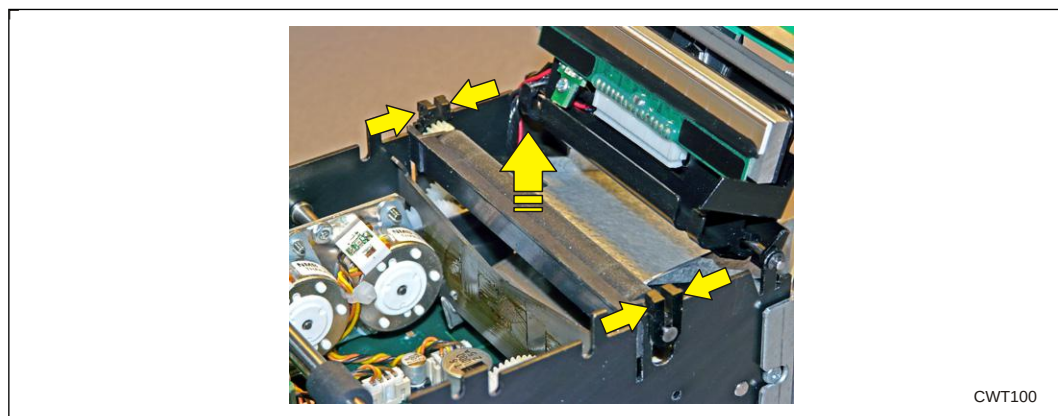
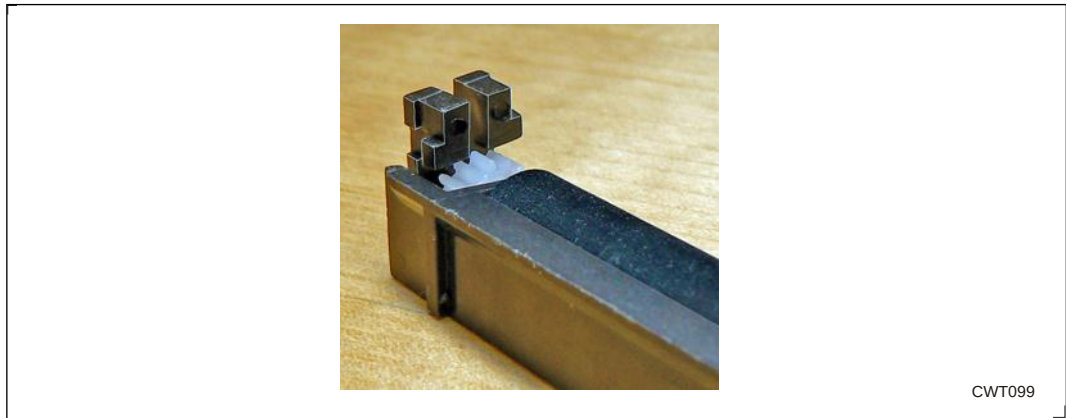


Figure 60. Removing the platen.

3. Lift the bearing at the opposite side up a little in the same way.
4. Remove the platen assembly with the plastic scrape.

ASSEMBLY

Install in reverse order. Be careful to orient the bearings as shown below.



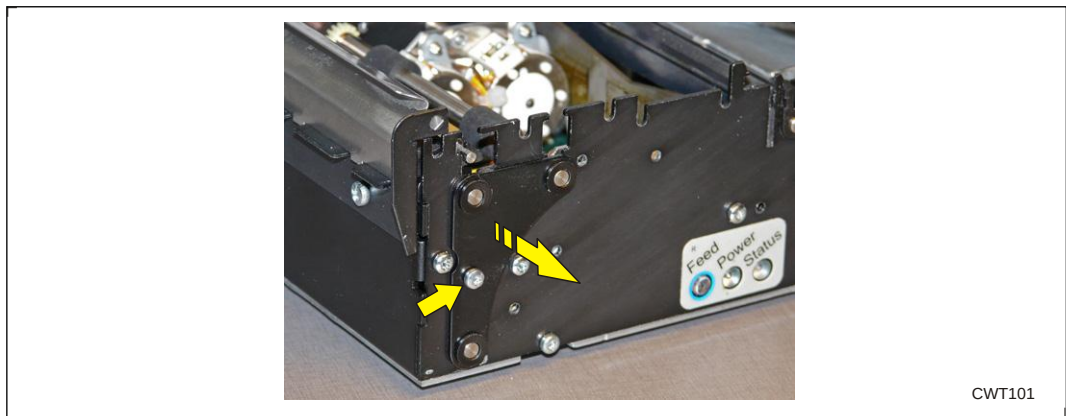
CWT099

Figure 61. Correct orientation of platen bearings.

8.2.10 Front and rear feed rollers replacement

REMOVAL

1. Remove the front and rear support roller assemblies and the presenter table.
2. Remove the screw (see arrow in Figure 62) holding the feed roller shaft bearing plate on the right side of the printer. This lets you remove the rear feed roller assembly. Removing the front feed roller assembly requires that you remove the corresponding plate on the left side as well.



CWT101

Figure 62. Replacing the feed rollers.

ASSEMBLY

Install in reverse order.

8.3 Cabinet door replacement

The door is fastened to the cabinet with an upper and a lower hinge pin. A spring helps pressing the pins into corresponding holes in the cabinet.

REMOVAL

 **CAUTION!** — The weight of the door is approximately 15 kg.

1. Turn OFF the ticket terminal.

2. Disconnect all cables running between the door and the cabinet.
3. Ensure that the upper hinge pin's locking screw (2 mm Allen key) is tightened.
4. Hold the door with a steady grip.
5. Loosen the lower hinge pin's locking screw (2 mm Allen key) and push the screw with the attached hinge pin up and out of grip with the cabinet. Lock the hinge pin in this upper position.
6. Carefully pull the lower end of the door out and then lower the door to disengage the upper hinge pin from the cabinet.

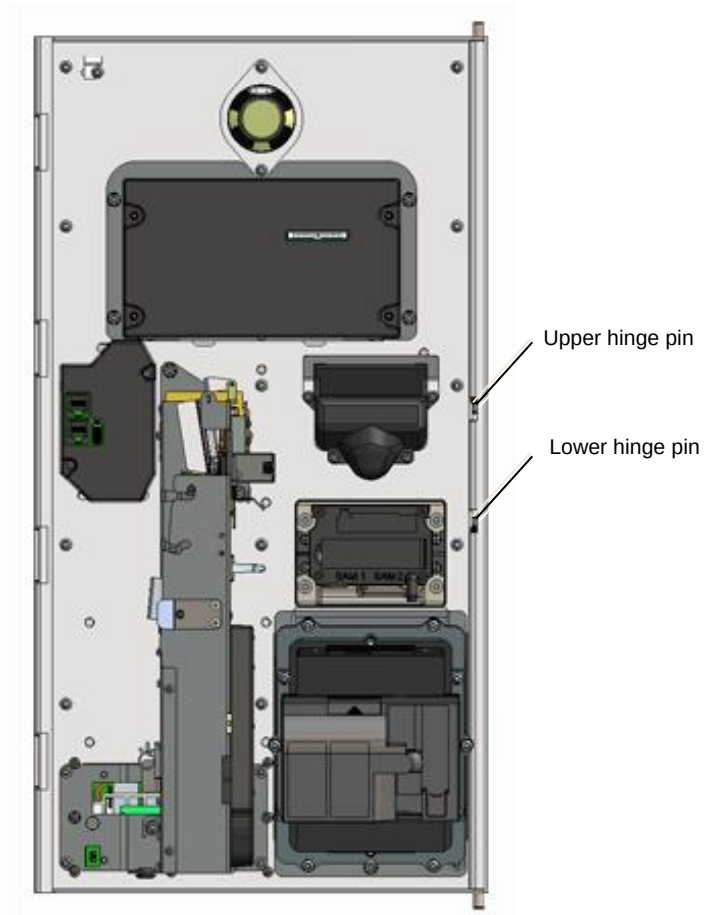


Figure 63. The door hinge mechanism.

ASSEMBLY

Install in reverse order.

Follow the directions above in reverse order.



IMPORTANT! — Loosen the lower hinge pin's locking screw to let the hinge pin enter the corresponding hole in the cabinet.

8.4 Base door replacement

The procedure is the same as for the cabinet door replacement described in Section 8.3, p. 74.

8.5 Display window replacement in CWT Compact

REMOVAL

1. Remove the six screws holding the window and remove the window frame.

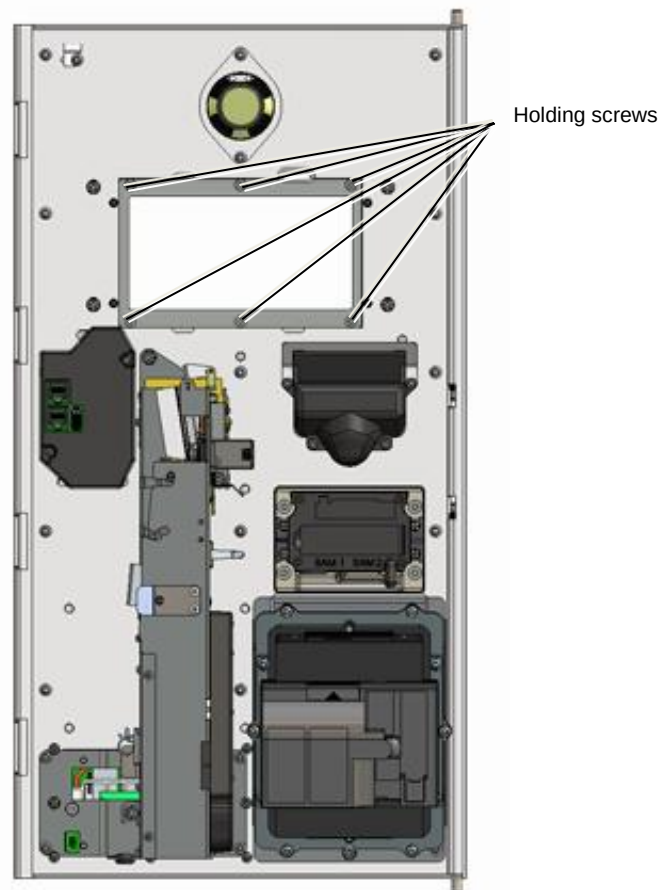


Figure 64. Changing the display window

2. Remove the window. Push from outside if necessary.

ASSEMBLY

Install in reverse order.

8.6 Coin unit replacement

REMOVAL

1. Disconnect all cables from the coin unit. The number of cables depends on the terminal model and configuration.
2. Loosen the two screw nuts, one at the top right side and one at the bottom of the left side as shown below.
3. Keep the locking latch pulled (see arrow) while you lift and remove the coin unit. Ensure that the black plastic coin slot insert in the door does not fall out.

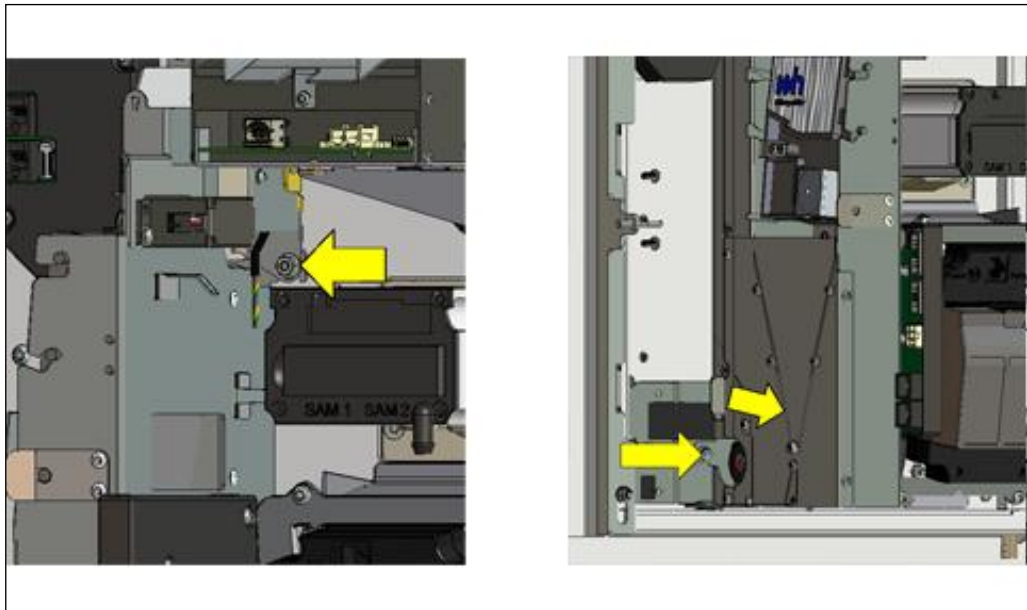


Figure 65. Removing the coin unit.

ASSEMBLY

Install in reverse order. Keep the assembly pressed down while tightening the screws.

8.7 Coin verifier replacement

REMOVAL

1. Ensure that there is sufficient free length of the verifier cable (see Figure 66). Loosen more of the cable from the cable clamp if necessary.
2. Keep the locking latch pulled out while you lower the coin verifier a bit and remove it.
3. Disconnect the cable at the back of the verifier.

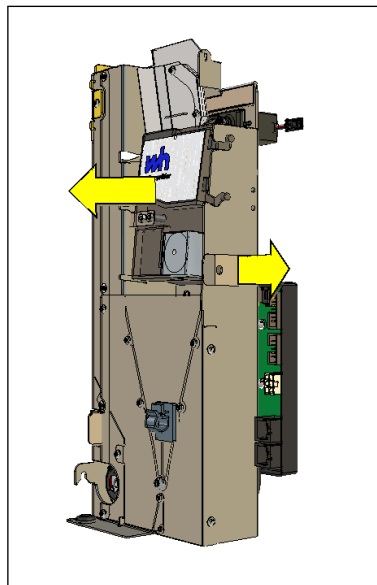


Figure 66. Removing the coin verifier

ASSEMBLY

Install in reverse order.

8.8 CPU board lithium cell replacement



WARNING! – Lithium batteries can be dangerous because they can explode if short-circuited. Handle batteries according to local laws and regulations.

REMOVAL

Carefully lift the battery holder tongue a little when you remove the battery cell.



WARNING! – Avoid using conductive objects due to the risk of short circuiting the battery.

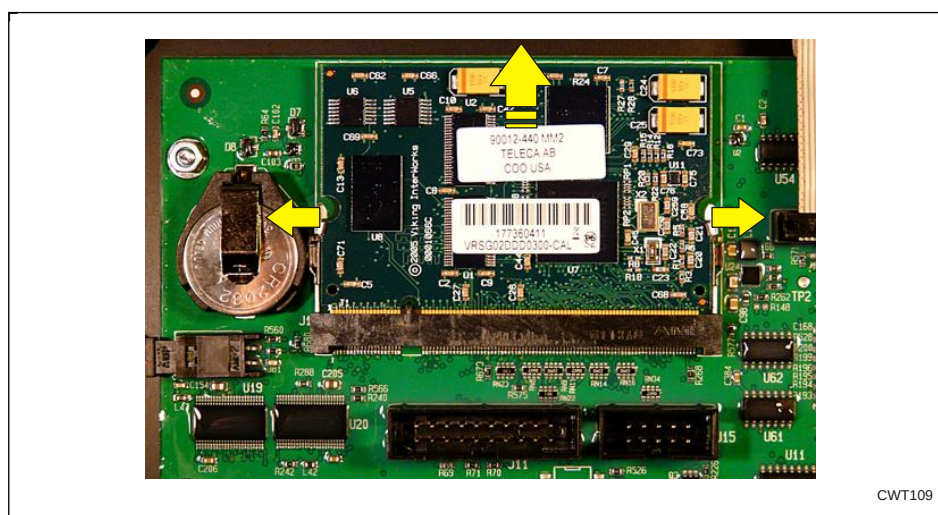
ASSEMBLY

Install in reverse order.

8.9 CPU core module replacement

REMOVAL

1. Release the PCB assembly by pushing the two locking latches outward at the same time. See left and right arrows in *Figure 67*.
2. Remove the module.



CWT109

Figure 67. Removing the CPU core module.

ASSEMBLY

1. Push the printed circuit board firmly into the connector. See *Figure 68*.
2. Lower the module toward the CPU board until the locking latches snap into locked position.



CWT110

Figure 68. Installing the CPU core module,

8.10 E-lock replacement

REMOVAL

1. Disconnect the cables from the E-lock.
2. Remove four nuts and remove the E-lock. A small box spanner (10 mm) is required to remove the lower E-lock due to limited space.

ASSEMBLY

1. Ensure that the dowel pin (see arrow) mates with the locking latches.

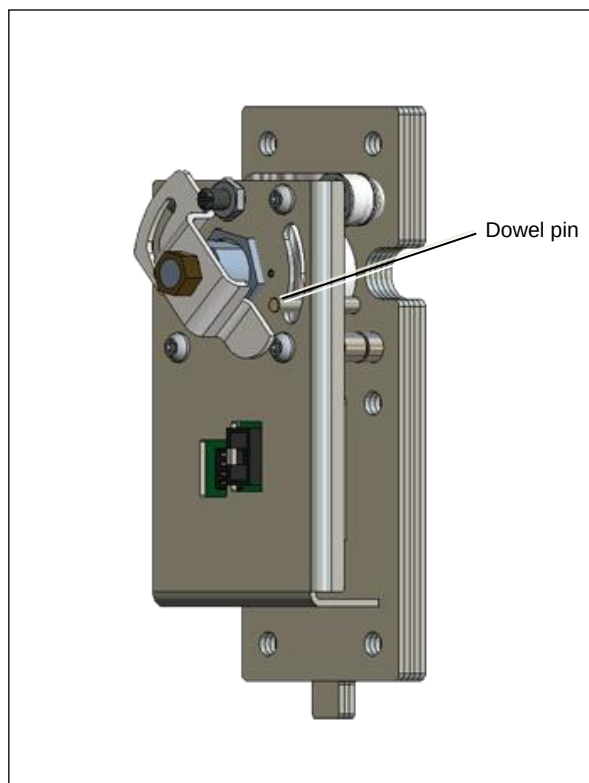


Figure 69. The dowel pin should mate with the locking latches.

2. Check that the DIP switch setting corresponds to the E-lock position in the terminal.

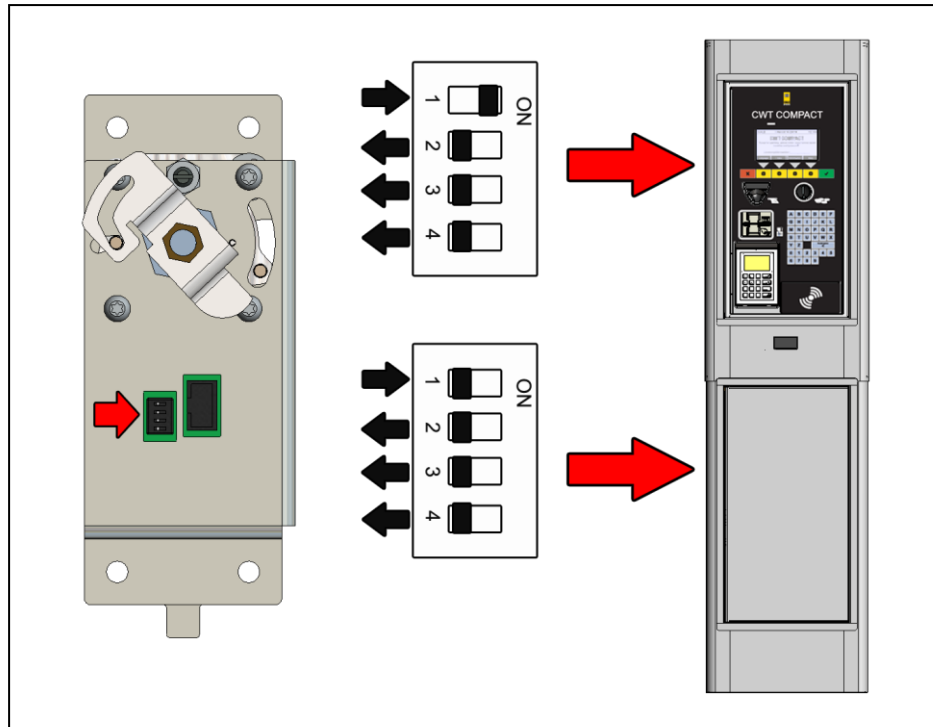


Figure 70. E-lock DIP-switch setting.

3. Start the terminal and close the cabinet door to get a printout showing the version of the E-lock AVR program. If necessary, update. See more about AVR updates in the *CWT Software Configuration Manual*.

9 CHANGING THE CWT COMPACT SOFTWARE AND FIRMWARE

9.1 Changing the CWT application program

See *CWT Software Configuration Handbook* on how to make changes in the application software files.

The whole CWT application, or parts of it, can be changed centrally via CWO or on site via the service menu.

In the latter case changes can either be keyed in one at a time or the service menu can be used to transfer new application files from a temporary storage medium, a USB stick for instance, via the USB port on the CPU board.

9.1.1 Changing via Cale WebOffice

See *Cale WebOffice 2 User Guide*.

9.1.2 Changing specific settings via the service menu

Many changes can be effectuated via the service menu. All the settings alternatives are described in the *CWT Software Configuration Handbook*.

9.1.3 Updating the whole application via the service menu

1. Insert a USB memory stick containing the new CWT application files into the USB port on the CPU board or the CPU board.
2. In the service menu select *Software update – Update application*
3. Select the appropriate device and folder with the *Go into* button.
4. Select the file *cdsapplsetup.CAB* with the *Choose* button. Updating will start. The terminal should restart upon completion. Otherwise, restart manually. A *system-out-of-order* message will be displayed briefly.

9.2 Updating the AVR firmwares

The firmware in all AVRs, except those in the E-locks, can be updated in three ways.

One way is to update via Cale WebOffice 2.

Note: that the E-lock AVR firmware can only be updated by the use of a PC.

AVR firmware changes are supplied as a zipped package containing the latest versions of the files concerning all the AVRs.

The table below describes the contents of the update package.

AVR Files	Top folder
Hex avr_coin.hex avr_compact.hex avr_piezo.hex avr_lock.hex avr_term.hex coinboot.hex cpuboot.hex termboot.hex eeprom.eep	Sub folder containing the AVR firmwares and AVR boot loaders. coin = Coin handling board compact = CPU board lock = Electronic locks piezo = keyboards The file <i>eeprom.eep</i> contains firmware version number etc.
JTAGmkII_473 AvrTargetJtagIcell.dll jtagiceii.exe jtagicemkii.dat	Sub folder. Contains PC program and related files required to run the updating procedure with the programming tool from a PC. Number 473 is the AVR Studio 4.12 build number.
avr_coin.bat avr_compact.bat avr_piezo.bat avr_lock.bat avr_term.bat	Executable files used when updating from a PC.

9.2.1 Updating the AVR firmwares through a USB memory device

This is how you update AVR firmware via the service menu using a USB memory device for file transfer:

The service menu will display the headings:

Software update

Update piezo AVR

Update coin AVR

Update main AVR

Updating procedure:

1. Select the AVR to be updated (*MAIN* = CPU board).
2. Connect a USB memory device containing the appropriate *avr_xxx.hex* file, for instance *avr_compact.hex* to a USB port on the CPU board.
3. Select the appropriate path to the hex file (device and folder). The USB device is regarded as a *hard disk*.
4. Selecting the hex file will start the updating procedure. The terminal should be restarted manually upon completion.

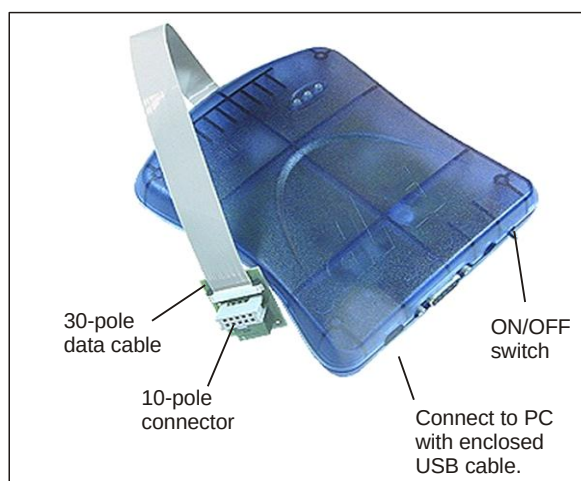
9.2.2

Updating the AVR firmwares from a PC

This section describes the upgrading by means of a PC and the **CWT Programming Kit 0501-B0810**, a special programming kit supplied by Cale.

The kit contains:

- Development tool *Atmel® AVR® JTAGICE mkII* with a fixed 30-pole flex cable with a 10-pole connector (see photo below). A USB cable and a 10-pole to 6-pole adapter are enclosed with the tool.
- Extension cable, 10-pole (Cale 0540-00123)
- *Segger J-link ARM*, a JTAG emulator **used to update the operating system** in CWT terminals.



CWT064 R2

Figure 71. The AVR® JTAGICE mkII development tool.

AVR programming procedure:

1. Get the AVR update package from Cale. Extract the files (to the desktop for instance).
2. Make sure that the program AVR Studio is installed in your PC and that the AVR Studio program have the same build number as indicated by the name of the JTAGmkII folder (for example *JTAGmkII_473*). AVR Studio updates can be downloaded from www.atmel.com/avrstudio.
3. Connect the *JTAGICE* programming tool to your PC and to the JTAG interface connector on the circuit board where the AVR to be updated is located (see Figure 72 – Figure 74 below).

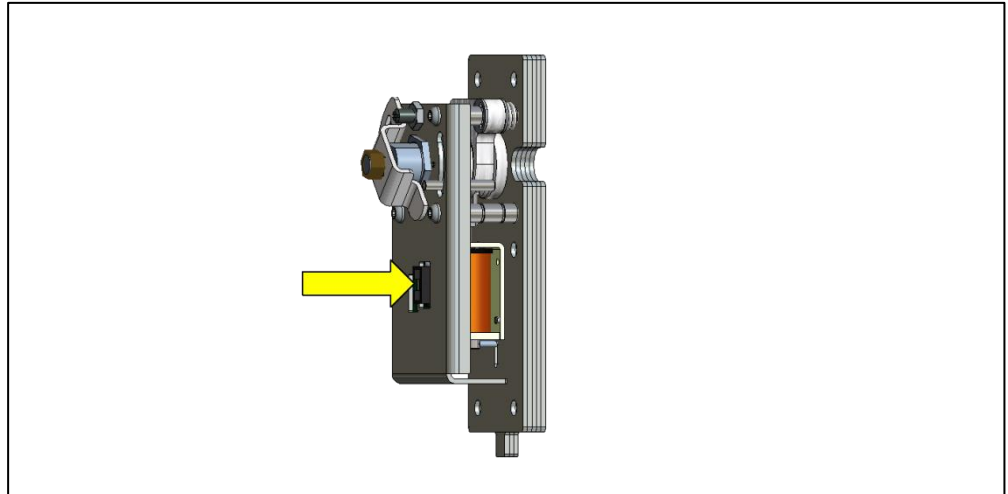


Figure 72. JTAG interface connector (6-pole) on electronic locks. Use the 6–10 pole adapter and turn the connector (not keyed) so that the cable exits the connector toward the cabinet or base door.

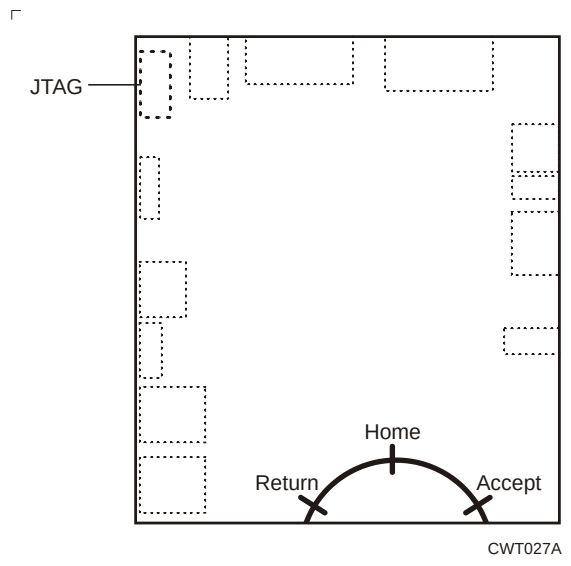


Figure 73. JTAG interface connector on coin handling board.

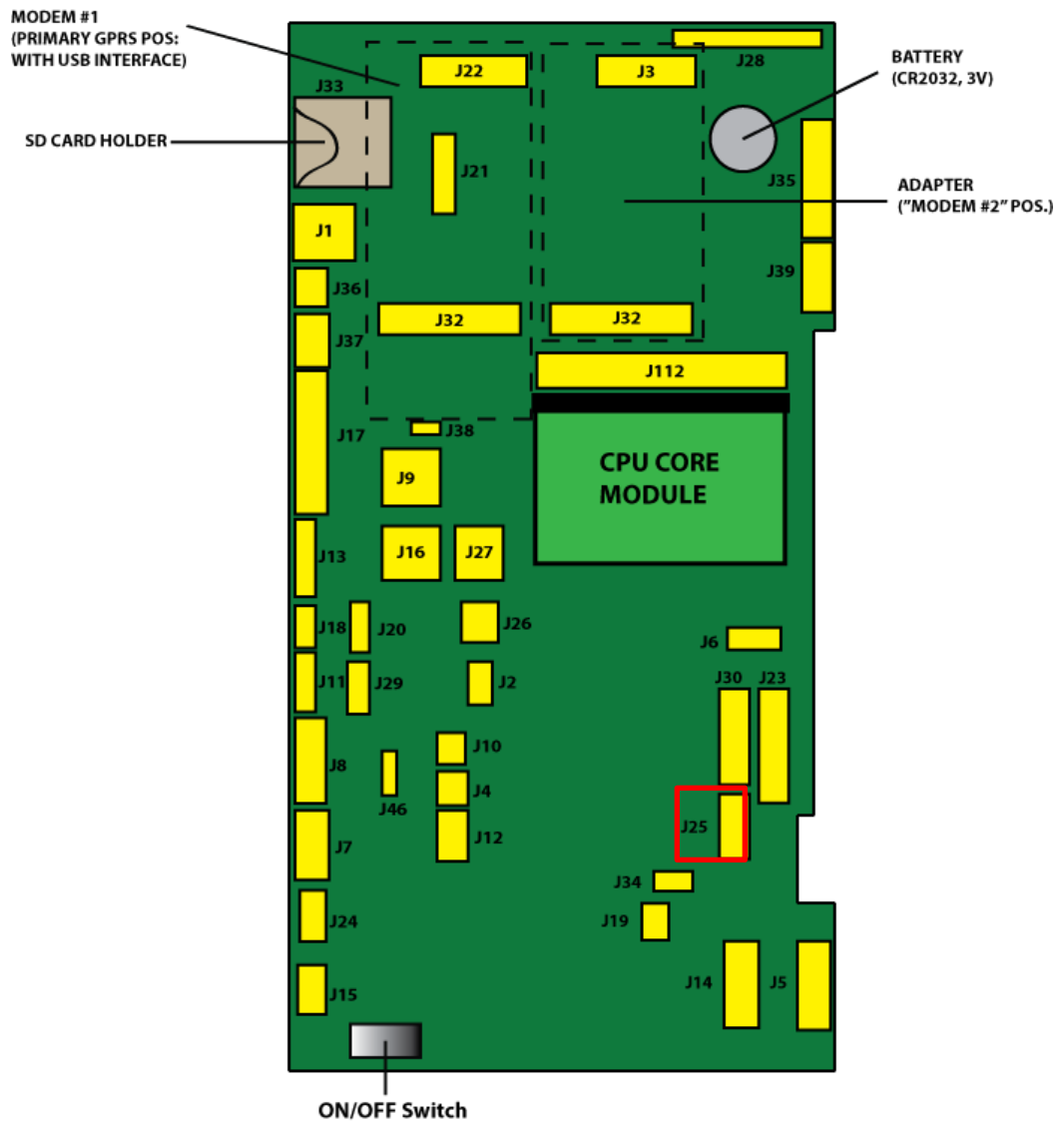


Figure 74. AVR programming JTAG interface connector on CPU board ("main board") Marked with red square.

3. Run the applicable executable file, for example **avr_coin.bat**. If the programming was successful, the message below will be shown:

```

-----
***** Programmed OK *****
*****
                          Press any key !
-----

```

Otherwise, this message will be displayed:

```

-----
##### !!!! FAILURE !!!! #####
#####
Please check connections and target pwr.
                          Press any key !
-----

```

Check that the terminal is switched ON and that power is supplied to the applicable circuit board. Then run the bat file once again.

9.3 Updating the printer firmware

The printer firmware can be updated via Cale WebOffice.

9.4 Updating the card reader firmware

The firmware of some card readers can be updated via Cale WebOffice.

9.5 Updating the Windows CE operating system from a PC

The operating system in CWT can be upgraded (or updated) by means of a PC running Windows XP (Section 0 describes how to update the OS from a USB stick).

IMPORTANT! — The OSLOG data may be overwritten during an update of the terminal's Windows CE operating system and a backup copy of the settings therefore needs to be saved and reinstalled during the updating procedure if OSLOG data should be saved.

For each OS upgrade Cale will supply a **CWT OS Upgrade Package**, a zip file containing new versions of the OS files and some other files.

9.5.1 Prepare the PC

You will need the **CWT Programming Kit 0501-B0810** supplied by Cale. The kit contains:

- Segger J-link ARM JTAG (interface) emulator.
- Development tool Atmel® AVR® JTAGICE mkII with fixed 10-pole ribbon cable, USB cable and a 10-pole to 6-pole adapter. This tool is used to update AVR firmware in all CWT models as described in section 9.2, p. 81.
- Extension cable, 10-pole (Cale 0540-00123) used for AVR programming only.

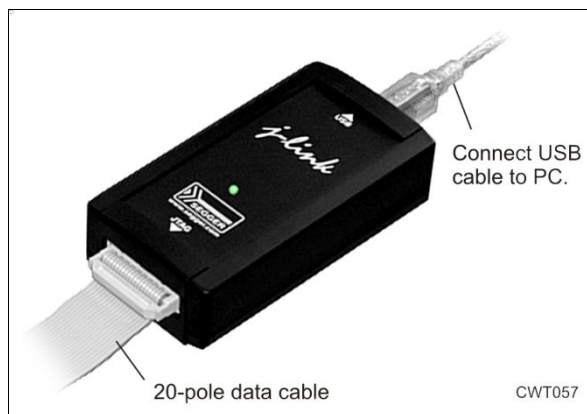


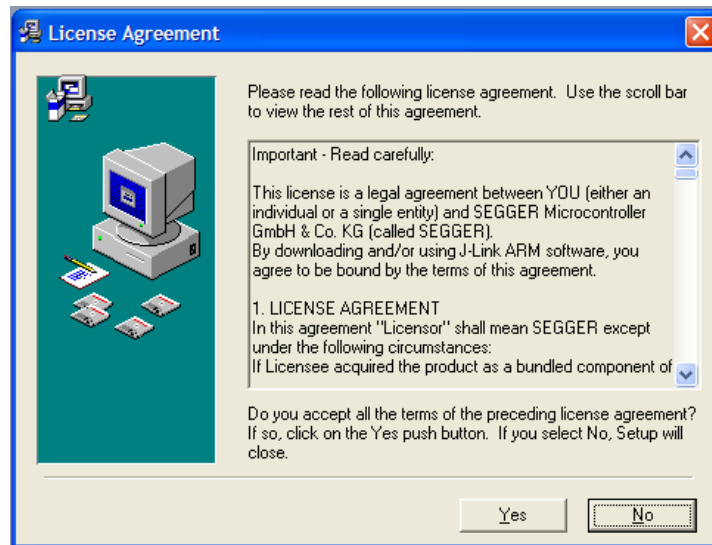
Figure 75. The J-link JTAG emulator

You also need the **CWT OS Software Installation Package** supplied by Cale.

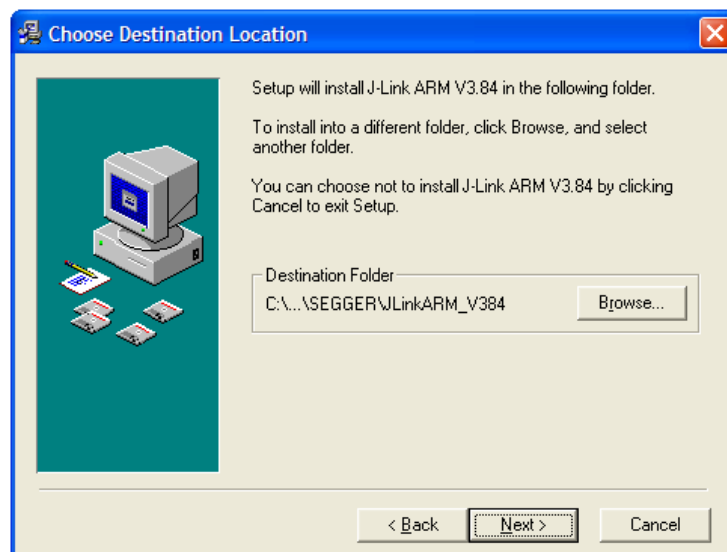
9.5.2 Install the JLinkARM PC program

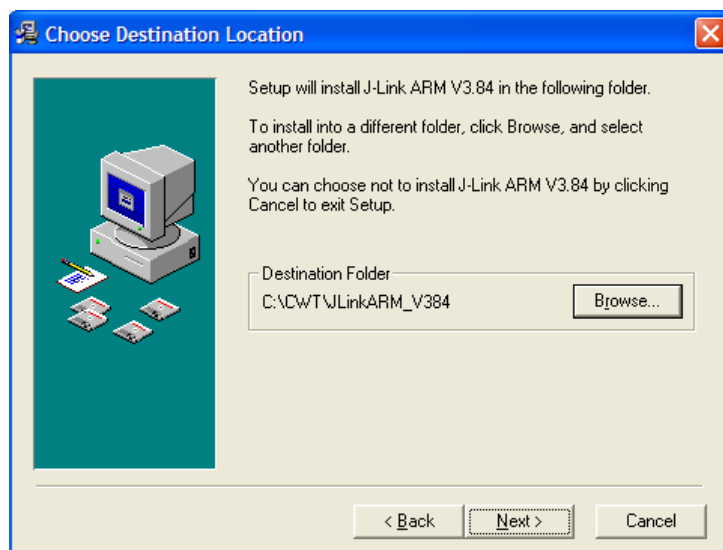
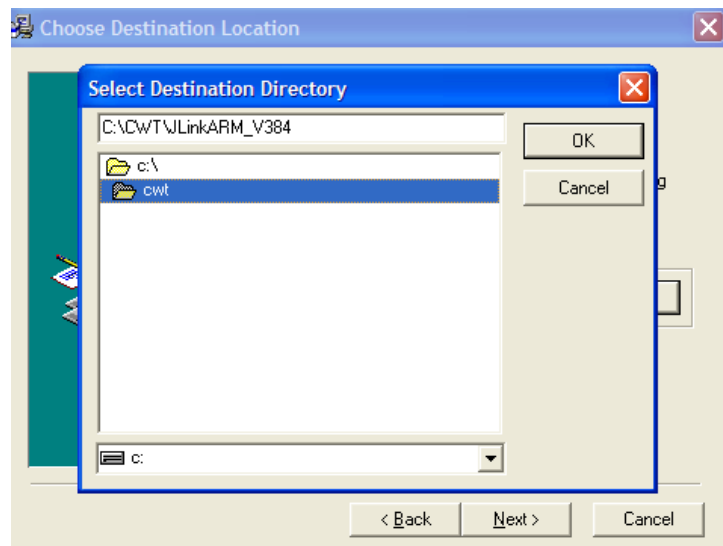
1. Extract the files contained in the **CWT OS Installation Package.zip** to a temporary folder, for instance a folder at the desktop.

2. Create the folder c:\CWT.
3. Run the file **Setup_JLinkARM_V384.exe** extracted in step 1.
4. Accept the license agreement by clicking the Yes button.

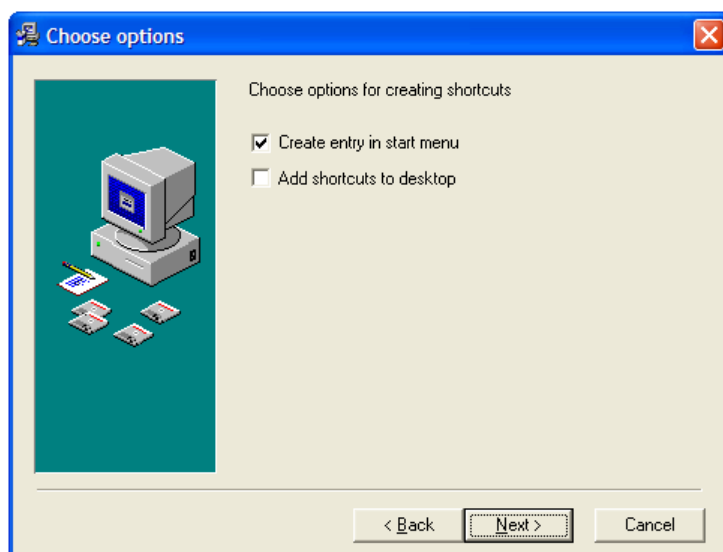


5. During the execution you have to select the destination folder c:\CWT created in step 2 (click Browse button and select the folder).

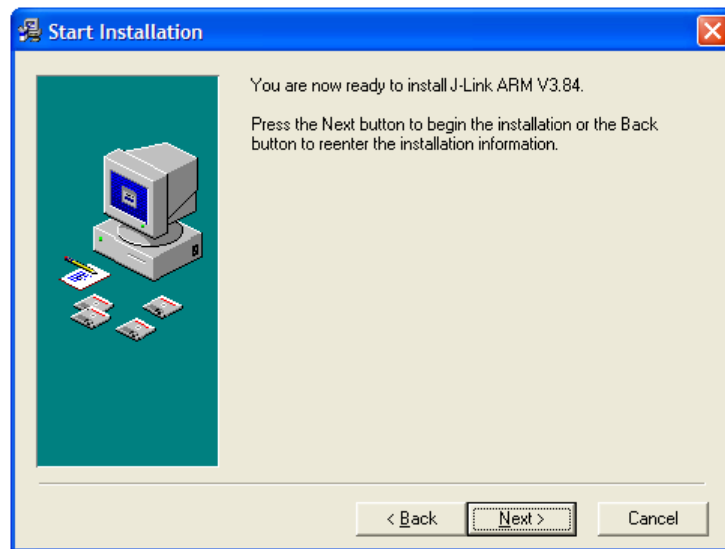




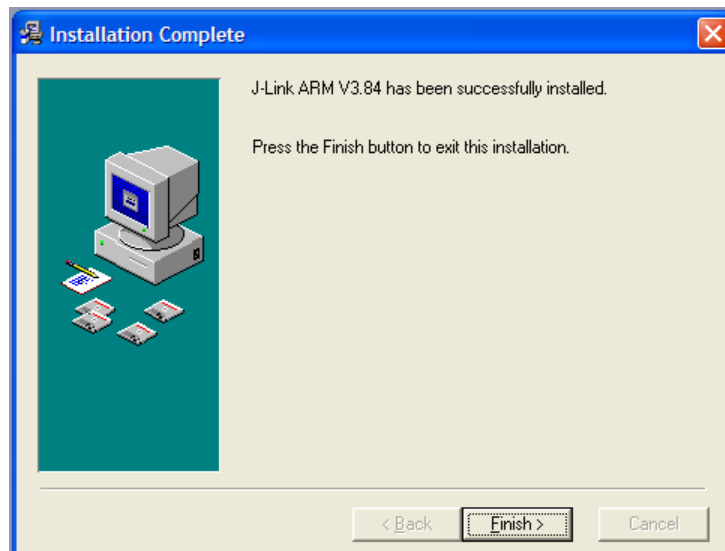
6. If desired you can create a shortcut in the start menu or at the desktop.



7. The actual installation will start when you press the Next button.



8. Press Finish button to exit.



9. Copy all the files extracted in step 1 and paste them into the folder `c:\CWT\JLinkARM_V384\` for future use.

9.5.3

Updating procedure

1. Get the latest version of the *CWT OS Upgrade Package* from Cale.
2. Replace the files ***IPL.nb0***, ***NK.nb0*** and ***STEPLDR.nb0*** in the folder `C:\CWT\JLinkARM_V384\CWT_OS_Files` on your PC with the corresponding files included in the *CWT OS Upgrade Package*.
3. Switch OFF the terminal.
4. Connect the J-Link JTAG Emulator to the CPU board connector J23 (CWT) and to your PC (see figure below).

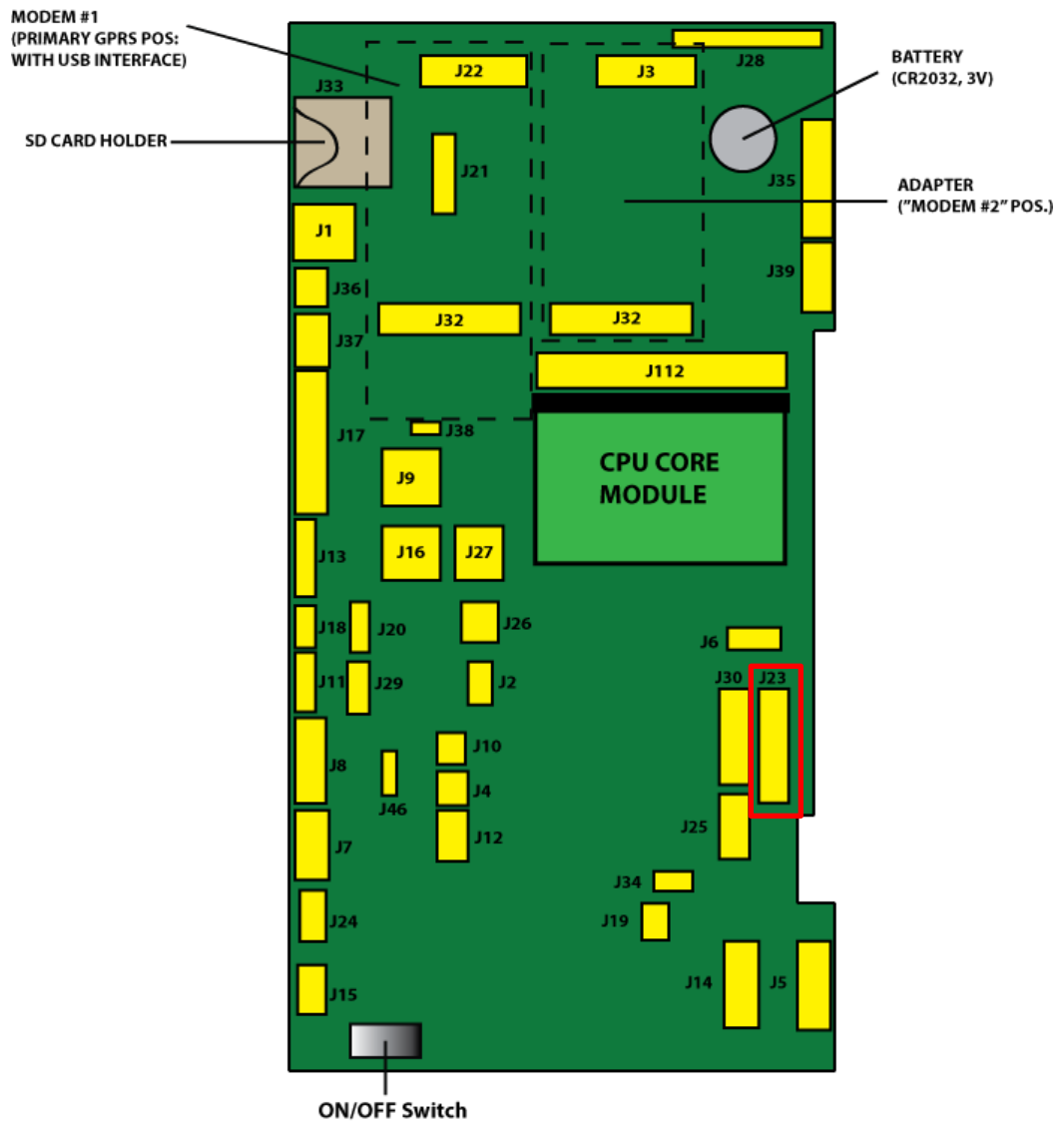


Figure 76. JTAG interface connector for OS loading on the CPU board .

5. Switch ON the terminal.
6. Run the file C:\CWT\JLinkARM_V384\Install.bat at your PC.
7. Wait for the message Script processing complete.
8. Wait for at least 2 minutes more.
9. In the new window on the screen, write "exit" and press Enter.
10. Switch OFF the terminal.
11. Remove the J-Link JTAG emulator from the CPU board.
12. Switch ON the terminal and check that it starts correctly.
13. Adjust date and time using the service menu.
14. Close the upper door and check the "closed door" printout to verify that the correct Windows CE version is installed.

9.6

Updating the Windows CE operating system from a USB memory device

For each OS upgrade Cale will supply a **CWT OS Upgrade Package**, a zip file containing new versions of the OS files and some other files.

With Windows CE Operating System **version 3.4.0.1 or later installed and running** in a CWT Compact terminal, the operating system can be updated from a USB memory device. This requires, however, that the file *UI.xaml* contains a specific tag that adds the alternative *Upload OS image from file* in the *Utilites* section in the service menu.

The procedures to modify the *UI.xaml* file and update the operating system are described below.

9.6.1

Updating the OS in CWT Compact

1. Save the file **nk.bin** supplied by Cale in the USB-memory stick, preferably in a new folder named OS.
2. Insert the USB-memory stick into the USB connector at the back of the lowered display module. This can be done with the terminal switched ON.
3. Open the cabinet door.
4. Select **Utilities** in the service menu.
5. Select **Upload OS image from file**
6. Step to the folder **IOS**.
7. Press the **Go into** button.
8. Step to the file **nk.bin**.
9. Press the **Choose** button. The updating process starts, but there is no indication that it is running.
10. Wait until the display returns to a previous display panel. This will take a couple of minutes.
11. With the USB memory still inserted, close the cabinet door. The terminal will issue a version ticket and then restart.
12. When the terminal is up and running again, open the cabinet door and remove the USB memory stick.
13. Close the cabinet door. A new version ticket is printed. Check the ticket to verify that the new OS-version has been successfully installed.